
DEPARTMENT OF
AGRICULTURE, FOOD & FORESTRY
OKLAHOMA
FORESTRY SERVICES
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The Oklahoma Forest Action Plan, 2020

A comprehensive analysis of forest-related conditions, trends, threats and opportunities

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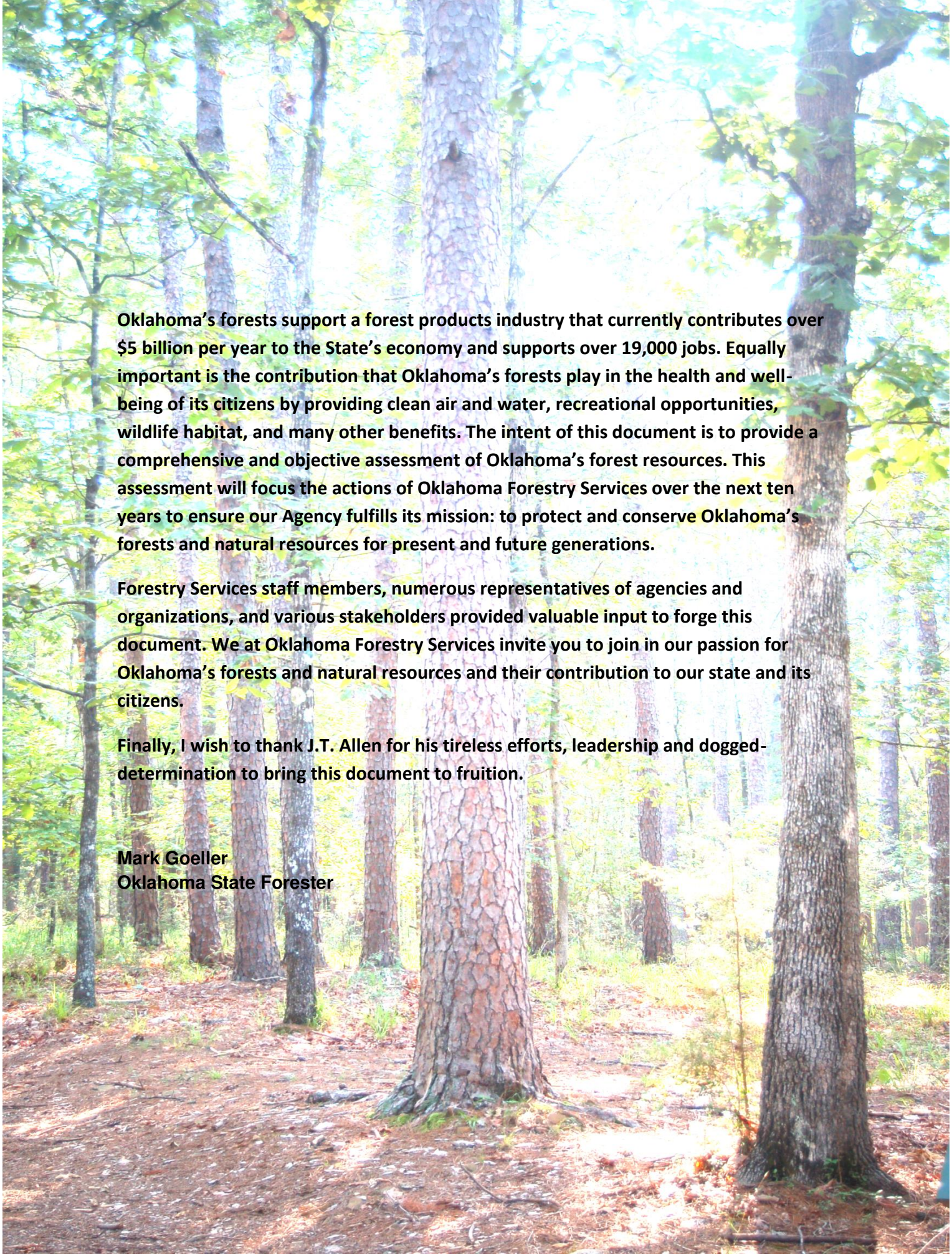

Oklahoma's forests support a forest products industry that currently contributes over $5 billion per year to the State's economy and supports over 19,000 jobs. Equally important is the contribution that Oklahoma's forests play in the health and well-being of its citizens by providing clean air and water, recreational opportunities, wildlife habitat, and many other benefits. The intent of this document is to provide a comprehensive and objective assessment of Oklahoma's forest resources. This assessment will focus the actions of Oklahoma Forestry Services over the next ten years to ensure our Agency fulfills its mission: to protect and conserve Oklahoma's forests and natural resources for present and future generations.

Forestry Services staff members, numerous representatives of agencies and organizations, and various stakeholders provided valuable input to forge this document. We at Oklahoma Forestry Services invite you to join in our passion for Oklahoma's forests and natural resources and their contribution to our state and its citizens.

Finally, I wish to thank J.T. Allen for his tireless efforts, leadership and dogged-determination to bring this document to fruition.

Mark Goeller
Oklahoma State Forester

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Acknowledgements

Development of Oklahoma's Forest Action Plan, Plan Update, and Plan Revision would not have been possible without the invaluable contributions of the following individuals, agencies, and organizations.

Lead Agency: ODAFF – Oklahoma Forestry Services

Oklahoma Forestry Services Program and Field Staff: Mark Goeller, Scott Huff, Andy James, Mark Bays, Drew Daily, Dieter Rudolph, Ryan Baldrachi, Mo Rice, Jason Whaley, Tom Murray, Michelle Finch-Walker, Suzanne McCombs, Doug Zook, Jeri Irby, David Porterfield, Ryan Oberst, Joshua Bradley, Elizabeth Corbishley, Jack Heinen, Kelsey Dahms, Kevin Keys, Brock Hill, Will Phifer, Craig Marquardt, Caleb Fields, Riley Coy, JT Allen, Craig Longshore, Evan Long.

Agencies and Organizations:
Oklahoma Department of Agriculture, Food and Forestry (ODAFF)
Oklahoma Department of Wildlife Conservation (ODWC)
Oklahoma Conservation Commission (OCC)
Oklahoma Water Resources Board (OWRB)
Oklahoma Forestry Advisory Committee (Forest Stewardship Committee)
Oklahoma State Technical Committee
Oklahoma State University – Natural Resource Ecology and Management (OSU-NREM)
University of Oklahoma - Oklahoma Biological Survey
National Association of State Foresters

Stakeholders that helped with issue groups, editing, or information needs in the original 2010 document, the 2015 update, and/or the 2020 revision:
Blayne Arthur, Secretary of Ag., Oklahoma Department of Agriculture, Food, & Forestry
Bruce Divis, Regional Park Manager, Oklahoma Tourism and Recreation Department
Bob Birchell, Private Consultant, Robert Birchell and Associates
Carl Henderson, Outreach Extension Specialist, Langston University Extension
Chris Hise, Four Canyon Preserve, The Nature Conservancy
Chris Wilson, Nickel Preserve Manager, The Nature Conservancy
Chuck Battles, President, Oklahoma Forestry Association
Dale Wilson, President, Oklahoma Woodland Owners Association
Dan Lewia, Executive Committee of Board of Directors, Oklahoma Forestry Association
David Stahle, Distinguished Professor, University of Arkansas
Gary McManus, State Climatologist, Oklahoma Climatological Survey
Janay Jeanis, Urban Forest Coordinator, City of Norman
Jay Pruett, Director of Conservation, The Nature Conservancy
Joe Roberts, Utility Forester, Public Service of Oklahoma
John Hendrix, Fish and Wildlife Biologist, Partners for Fish and Wildlife Program, USFWS
John Mustain, Resource Conservationist, NRCS
Kelly Hurt, former Firewise Coordinator, Oklahoma Forestry Services
Lisa Knauf, District Services Director, Oklahoma Conservation Commission
Mark Howery, Wildlife Diversity Biologist, Oklahoma Department of Wildlife Conservation
Melvin Mashburn, Rural Fire Coordinator, Grand Gateway Economic Development Association
Michael Larson, Coordinator, OSU Cartography Services
Mike Countess, Policy Analyst, Southern Group of State Foresters
Mike Porter, Wildlife and Fisheries Consultant, The Noble Foundation
Mike Sams, Senior Biologist, Oklahoma Department of Wildlife and Conservation
Mike Thralls, Executive Director, Oklahoma Conservation Commission
Randy McFarlin, Director, Parks and Recreation of Ada
Robert Doke, State Fire Marshal, State Fire Marshal Commission
Rodney Will, Associate Professor, OSU-NREM

Rod Wanger, Chief of Conservation and Special Programs, USDA Farm Services Agency
Ross Huffman, Regional Biologist, National Wild Turkey Federation
Rusty Booker, Manager, International Paper
Sancho Dickinson, Director, ODAFF-Consumer Protection Services
Scott Pace, Coordinator, NRCS/Ouachita Mountains RC&D
Terry Peach, Commissioner of Ag. (Retired), Oklahoma Department of Agriculture, Food, & Forestry
Tim Mersmann, Rural Forestry Program Manager, Southern Region, USDA Forest Service

Executive Summary

Oklahoma Forestry Services originally assessed the forest resources of the state in the early 1980s. Significant changes in the demands on our forests led Congress to mandate that each state develop a new assessment and a strategic plan to help guide the programs that affect them. The Oklahoma Forest Action Plan was developed in response to this mandate.

Oklahoma has a diverse landscape with nine different forest types and ten major ecoregions. Forest types that are commonly associated with states in the northeast, the southeast, the southwest and even the Rocky Mountains are represented across Oklahoma's landscape. Oklahoma exhibits many soil types: limestone, sandstone, and shale soils of the prairie; fertile alluvial soils along rivers and streams; and the distinct red clay soils of western Oklahoma. Oklahoma's climate is continental with mild winters and hot, humid summers and temperatures ranging from 65º F in the southeast to 55º F in the Panhandle. Most of Oklahoma's precipitation occurs in the spring and fall averaging over 50 inches in southeastern Oklahoma to just 18 inches in the northwest. Oklahoma occasionally suffers through extended periods of drought that tend to limit native vegetation communities to a great extent, especially along the western fringes of the eastern and southeastern forest types common to the United States' eastern states.

Oklahoma is usually depicted as a land of wide-open prairies and few trees. People are generally surprised to learn that more than one-quarter of the state's 44.7 million acres is forested. According to 2018 Forest Inventory and Analysis data Oklahoma's landscape is covered with approximately 11.8 million acres of forests compared to a historical figure of 13 million acres. The state's most productive forests, in terms of growth rates, are found in the eastern and southeastern part of the state, but forests with unique and significant values can be found statewide.

The diversity of Oklahoma's landscape presents many natural resource management challenges. Oklahoma's forests are approximately 85% privately owned. Many of these private forestlands, valued for so many resources and different objectives, are being lost to urban and suburban developments and infrastructure; to oil, gas and other mineral exploration and production; and to conversion to croplands and grazing lands. Economic pressures on forest owners, such as escalating land values and estate taxes, often lead to the conversion of rural areas into developed areas that extend into cities and towns. The state's population continues to increase and more people want their own private five- to ten-acre tract. These pressures contribute to the permanent loss of forested landscapes.

There are also numerous other threats including insects and diseases, invasive species and wildfires that need more progressive strategies to assure the conservation of our forest resources. Oklahoma Forestry Services needs to evaluate the way it delivers its programs to guarantee efficiency and effectiveness of its efforts to serve the public's need for healthy and sustainable forest resources.

As part of the State & Private Forestry (S&PF) Redesign process and required by an amendment to the Cooperative Forestry Assistance Act (CFAA), as enacted in the 2008 Farm Bill, each state was required to complete their initial State Assessment and Resource Strategy by June 18, 2010. This document is the ten year revision to be completed by June 30, 2020. There are three components to the assessment and planning strategy: Statewide Assessment of Forest Resources, Statewide Forest Resource Strategy, and Annual Report on Use of Funds.

Congress is requiring additional accountability on how federal funds are spent and wants assurance that the nation's most important forestlands are being targeted. In response to these increasing demands, the USDA Forest Service, in cooperation with the National Association of State Foresters is in the process of transforming how federally funded S&PF programs are being delivered.

The S&PF Redesign focuses on three State and Private Forestry national priorities: conserve working forests, protect forests from harm, and enhance benefits from trees and forests. The 2008 Farm Bill requires at a minimum that state assessments include:

- An analysis of forest conditions and trends
- Forest related benefits and values

- Threats to the forest resources
- Issues of concern and opportunities for action
- Priority rural and urban forest landscapes
- Multi-State or regional priority areas
- A review of existing statewide natural resource plans

The Oklahoma Forest Resource Assessment was developed by Oklahoma Forestry Services with the help of interested stakeholders. The assessment describes the condition of the forest resources as well as the associated benefits and values. Oklahoma Forestry Services and stakeholders identified several critical forest issues impacting Oklahoma's forests. These issues are described in detail in this assessment. These priority forestlands identified depict where work and funding should be focused in the state. Strategies to address the high priority forestlands will be discussed in the Oklahoma Forest Resource Strategy. The five critical forest issues identified and described within this assessment are:

- Forest Sustainability and Health
- Wildfire Risk to the Forest Resource
- Forest Economics and Markets
- Water Quality and Availability
- Community Forest Health and Care

Several statewide and regional natural resource plans were used in developing this Statewide Forest Action Plan including the 2016 Oklahoma Comprehensive Wildlife Conservation Strategy, The Oklahoma Forest Legacy Plan, the 2012 Statewide Comprehensive Outdoor Recreation Plan and the 1980 Oklahoma Forest Resource Issues Assessment.

SECTION 1

FOREST RESOURCE ASSESSMENT

Forest Resource Conditions, Benefits, and Threats

Oklahoma's forests are very diverse since the state is situated within a transition zone for climate and vegetative cover. Eastern Oklahoma's forests consist of tall oak, hickory, and pine species; central Oklahoma's forests consist mostly of oak and bottomland hardwood trees; and western Oklahoma's forests are mostly upland oaks, bottomland hardwood, juniper and urban trees. The temperature and annual precipitation are significantly different between the northwest and southeast corners of the state, which make an obvious difference in the type of vegetation that grows as well as biodiversity found. All of the forests provide Oklahomans with numerous benefits and values such as wood products, job opportunities, economic growth, wildlife habitats, clean air and water, and recreation. These benefits and values provided by the forests are threatened by many factors and could be lost if forests are not sustainably managed.

Forest Resource Conditions

In this statewide assessment of Oklahoma's forest resources, nine different forest types occurring within 10 diverse ecoregions are described. Forests are found throughout the state but most occur in the central and eastern regions. Variations in soils, climate, and topography play a major role in the type and size of the state's trees and vegetation. Some of the oldest trees found in the state range from only 10 to 30 feet tall. Oklahoma's forests have a rich history and have recovered well from the excessive timber harvesting of the early settlers. Oklahoma's forests cover almost 27 percent of the landscape and the vast majority of the forests are owned by private landowners.

Oklahoma's Topography, Climate, and Natural Resources

The climate and topographic features of Oklahoma are summarized within this section by Gary McManus with the Oklahoma Climatological Survey. Oklahoma is located in the southern Great Plains. Of the 50 states, it ranks 20th in size, with an area of 43,954,560 acres, over 800,000 acres of which are covered by water and 11,839,462 acres are covered by forests (2018 Forest Inventory and Analysis Data). The terrain is mostly plains, varying from nearly flat in the west to rolling in the central and near east, with a general slope upward from east to west.

Topographic Features

The plains are broken by scattered hilly areas, covered by small oak trees, where most points are 600 feet or less above the adjacent countryside. These hilly areas include the Wichita Mountains in the southwest, and the Arbuckle Mountains in the south-central. The Ouachita Mountains, where pine – hardwood forests grow, dominate much of the southeast, with peaks that rise as much as 2,000 feet above the base. Extreme east central Oklahoma features the mountains of the Arkansas River Valley, which rise several hundred feet above the plains.

Extreme northeastern counties are part of the Ozark Plateau, which is marked by steep, rocky river valleys between large areas of hills and rolling plains covered with large hickory and oak trees. The western tip of the panhandle features part of the Black Mesa complex, a fractured terrain featuring large mesas overlooking seasonal creeks and riverbeds. Near Black Mesa State Park is the only area of the state where native pinyon pine and ponderosa pine forests and woodlands are found. Elevations run from 287 feet above sea level where the Little River exits in southeastern Oklahoma to 4,973 feet on the Black Mesa near the New Mexico border.

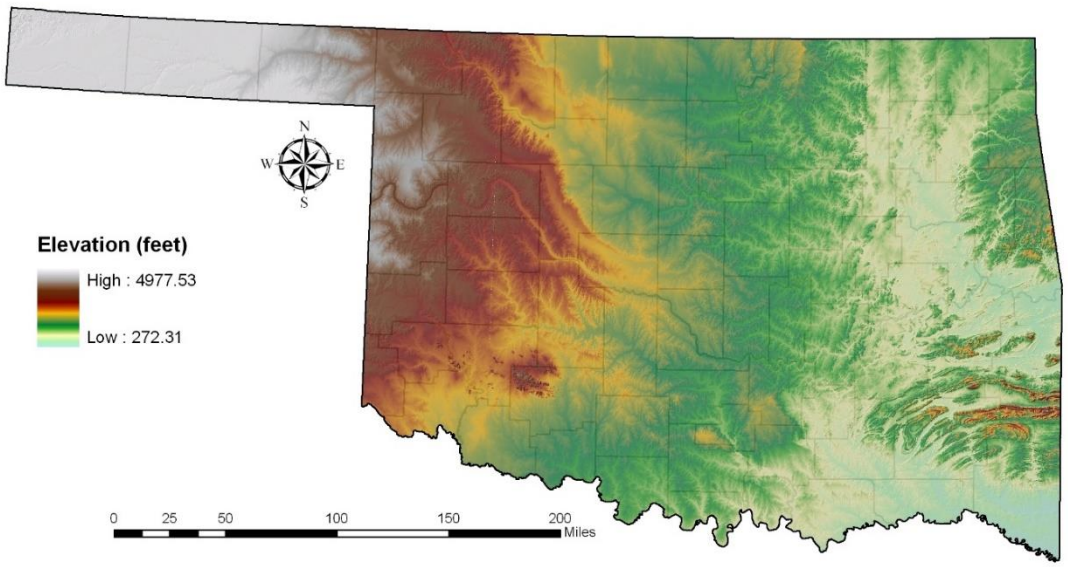


Figure 1: Map of Oklahoma elevations.

Oklahoma lies entirely within the drainage basin of the Mississippi River. The two main rivers in the state are the Arkansas, which drains the northern two-thirds of the state and the Red, which drains the southern third and serves as the state's southern border. Principal tributaries of the Arkansas are the Verdigris, Grand (Neosho), Illinois, Cimarron, Canadian, and North Canadian. The Washita and Kiamichi serve as the Red's principal tributaries in Oklahoma, with the Little River flowing into the Red after it crosses into Arkansas. Along the main rivers and tributaries is where the bottomland hardwood forests can be found. The hardwood species growing in the bottomland hardwood forests differ from east to west.

Climatic Features

The climate of Oklahoma is continental, as is all the Great Plains Region. Warm, moist air moving northward from the Gulf of Mexico often exerts much influence, particularly over the southern and eastern portions of the state, where humidity, cloudiness and precipitation are resultantly greater than in western and northern sections. Summers are long and usually quite hot. Winters are shorter and less rigorous than those of the more northern Plains states. Periods of extreme cold are infrequent, and those lasting more than a few days are rare.

The mean temperature over the state ranges from 64° F along the Red River to about 58° F along the northern border. It then decreases westward to 56° F in Cimarron County. The number of days reaching or exceeding temperatures of 90° F ranges from 60-65 days per year in the northern corners of the state, about 115 days in the southwest, and 85 days in the southeast. Temperatures of 100° F or higher occur, frequently during some years, from May through September, and very rarely in April and October. Years without 100° F temperatures are rare, ranging from about one of every seven years in the eastern half of the state to somewhat rarer in the west.

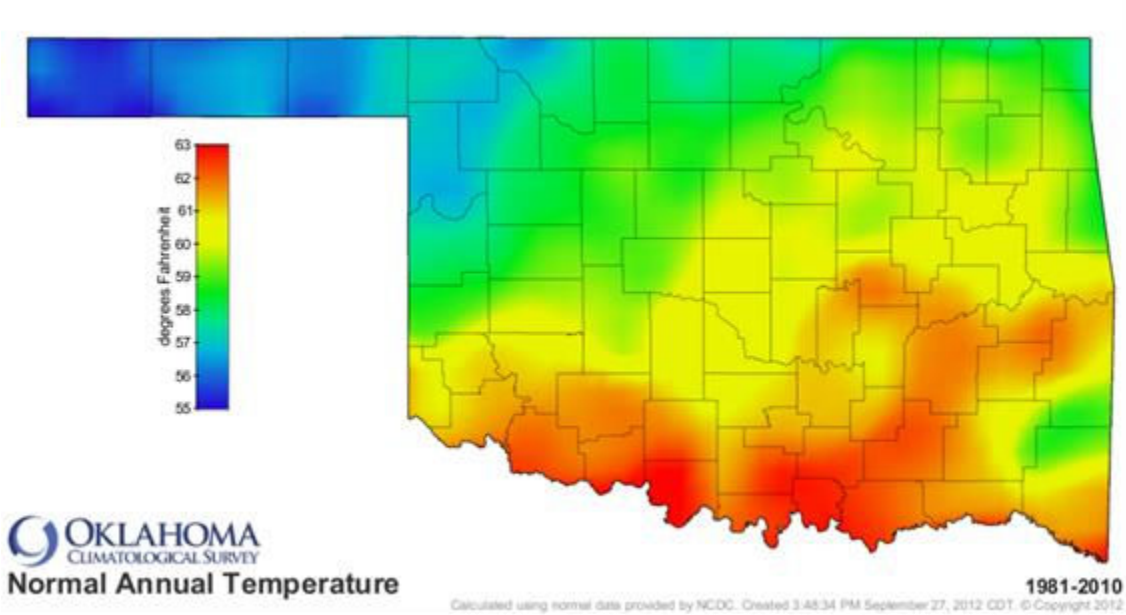


Figure 2: Map of average temperature across Oklahoma.

The average length of the growing season, or freeze-free period, is at a maximum of about 225-230 days in the southern tier of counties and in the Arkansas River valley downstream of Tulsa. The general northwest-to-southeast gradient is interrupted in the Ouachita Mountains, where growing seasons are three to four weeks shorter compared to surrounding areas. Frozen soil is not a major problem, nor much of a deterrent to seasonal activities. Its occurrence is rather infrequent, of very limited depth, and of brief duration. The average depth that frost penetrates the soil ranges from less than three inches in the southeastern corner of the state to more than ten inches in the northwestern reaches.

The dominant feature of the spatial distribution of rainfall is a sharp decrease in rainfall from east to west. Although precipitation is quite variable on a year-to-year basis, average annual precipitation ranges from about 16 inches in the far western panhandle to about 56 inches in the far southeast. The climatological maximum for precipitation comes in late spring for almost all of the state east of the panhandle. On average, May brings more precipitation than any other month across 65% of Oklahoma. A significant secondary maximum of precipitation exists during early autumn for most of the state. This secondary peak typically occurs in September and is more pronounced in the eastern third of the state. Excessive rainfall occurs at times and has been recorded to amount to ten inches or more in 24 hours.

The winter precipitation gradient of annual snowfall is nearly opposite that of precipitation, in that it increases from less than an inch in the extreme southeast to more than 32 inches in the western panhandle. Locations in southeast Oklahoma have gone several years between snowfall events, while northwestern Oklahoma typically records several snow events in one winter. Snowfall remaining on the ground for more than a few days is an uncommon occurrence in northwestern Oklahoma, quite rare in central Oklahoma, and almost unheard of in the southeast. Freezing rain is a distinct wintertime hazard for Oklahoma and the state has suffered from significant ice storm damage in the past 15 years.

Floods and droughts both are a recurring part of Oklahoma's climate cycle. Floods of major rivers and tributaries may occur during any season, but they occur with greatest frequency during those spring and autumn months associated with the greatest rainfall. Flash flooding of creeks and minor streams remains a serious threat, especially in urban and suburban areas, where development and removal of vegetation have increased storm water runoff.

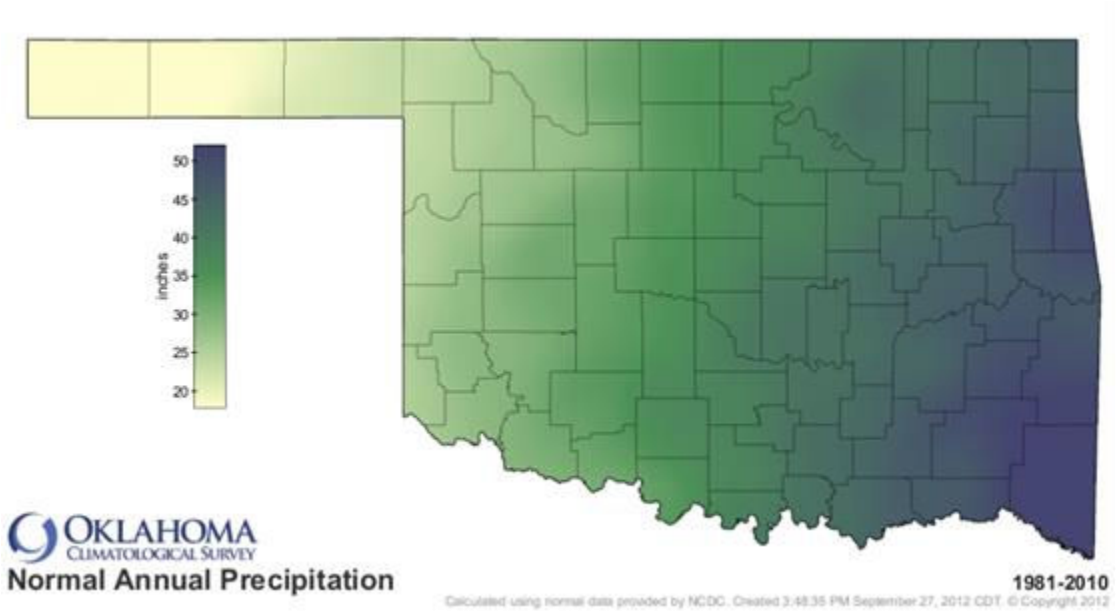


Figure 3: Map of average annual precipitation across Oklahoma.

Almost all of Oklahoma's usable surface water comes from precipitation that falls within the state's borders. Western Oklahoma tends to be more susceptible to drought because precipitation there tends to be more variable and marginal for dryland farm applications. Drought episodes can last from a few months to several years. Those that last a few months can elevate wildfire danger and impact municipal water use. Multi-season and multi-year episodes can severely impact large reservoirs, streamflow, and groundwater. The agricultural impact of drought is increasingly mitigated on a farm-by-farm and year-by-year basis through irrigation of crops, mostly with water from aquifers. This practice dominates much of the panhandle and some of the rest of western Oklahoma.

Other climatic features Oklahoma is known for are the prevailing winds, severe thunderstorms, hail, and tornados.

Natural Resources

Oklahoma's natural resources such as soils, vegetation, mineral resources, and wildlife create high biodiversity and provide great values and benefits to the state. The many natural resources found within the state collectively create and identify the diverse and unique landscape. This section helps depict the overall picture of Oklahoma's landscape but also covers a few of the requirements for the Forest Legacy Program.

Soils

Oklahoma's major soil associations are grouped by Major Land Resource Areas (MLRA) and/or geographic regions. Geology, topography, climate, plants, animals, and time play a major factor in soil formation. Color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, pH, and other features are used to characterize soils. After a soil is described and its properties are determined, soil scientists assign the soil to one of 12 taxonomic orders and/or one of many suborders. There are seven of the 12 taxonomic orders represented on the map below: Entisols, Mollisols, Aridsols, Alfisols, Inceptisols, Vertisols and Ultisols. Alfisols and Ultisols are the most abundant soil taxonomic orders in Oklahoma's forests.

In western Oklahoma, the Canadian Plains and Valleys MLRA contains brown, loamy soils developed on sandstone escarpments, basalt, and associated foot slopes under mid and short

grasses. The High Plains and Breaks soils consist of dark-colored loams and clay loams under mid to short grasses. In the Central Rolling Red Plains MLRA, there are brown to light-brown loams and sands with clay-loam to sand under mid grasses, small oaks, cedars, and shrubs.

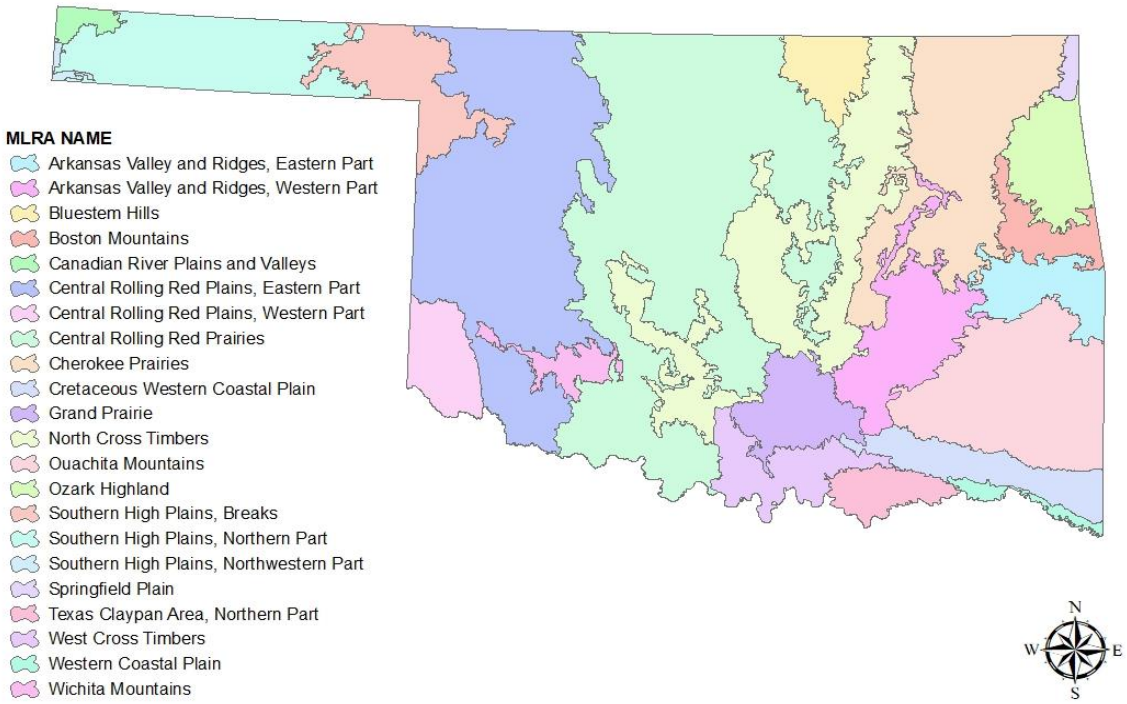


Figure 4: Oklahoma major land resource areas.

In central Oklahoma, the Central Rolling Red Prairies contains dark and loamy soils with clayey to loamy subsoils developed on Permian shales, mudstones, sandstones, and alluvial deposits under tall grasses and some small oak trees. Soils of the Cross Timbers are light colored, sandy, with reddish subsoils under mostly post oak, blackjack oak, and some hickory forests with prairie openings. The Bluestem Hills and Cherokee Plains contain deep-colored soils mostly with clay subsoils under tall grasses and few trees. The Grand Prairie – Arbuckle Mountains MLRAs are dark and loamy to clayey subsoils beneath small oaks, cedars, shrubs, and some mid grasses.

In eastern Oklahoma, the Ozark Highlands-Boston Mountains have brown to light-brown silty soils with reddish clay subsoils under oak-hickory-pine forests and some tall grasses. The Ouachita Mountains are light colored, acid, sandy, and loamy with clayey subsoils also under oak-hickory-pine forests. Arkansas Ridge and Valley soils are loamy, rocky, and well drained. Coastal Plain soils are light colored, acid, and sandy with clay-loam to clay subsoils under oak-pine (east) and oak-hickory (west) forests.

Detailed information for each major soil type in published by the NRCS in soil surveys for most of the 77 Oklahoma counties.

Oklahoma Ecoregions

Oklahoma lies at the crossroads of major ecological divisions (humid temperate versus dry domains per Bailey), resulting in one of the largest natural diversities of any state. An ecoregion is an ecologically and geographically defined area that is characterized by its biodiversity, flora, fauna and ecosystems. Each ecoregion is distinct from that of other ecoregions. A recent refinement of the state's ecoregions, by Oklahoma Forestry Services for the purposes of this Assessment, was completed in 2009 which identified 10 diverse ecoregions, more than any other state except Texas. Oklahoma has an extremely diverse landscape which is described in detail in each of the ecoregion descriptions below. Forest types that are commonly associated with states in the northeast, the southeast, the southwest and even the Rocky Mountains are represented here. This tremendous diversity in Oklahoma's forests creates opportunities and challenges to identify areas that are more than just uncommon, but which have truly special environmental attributes.

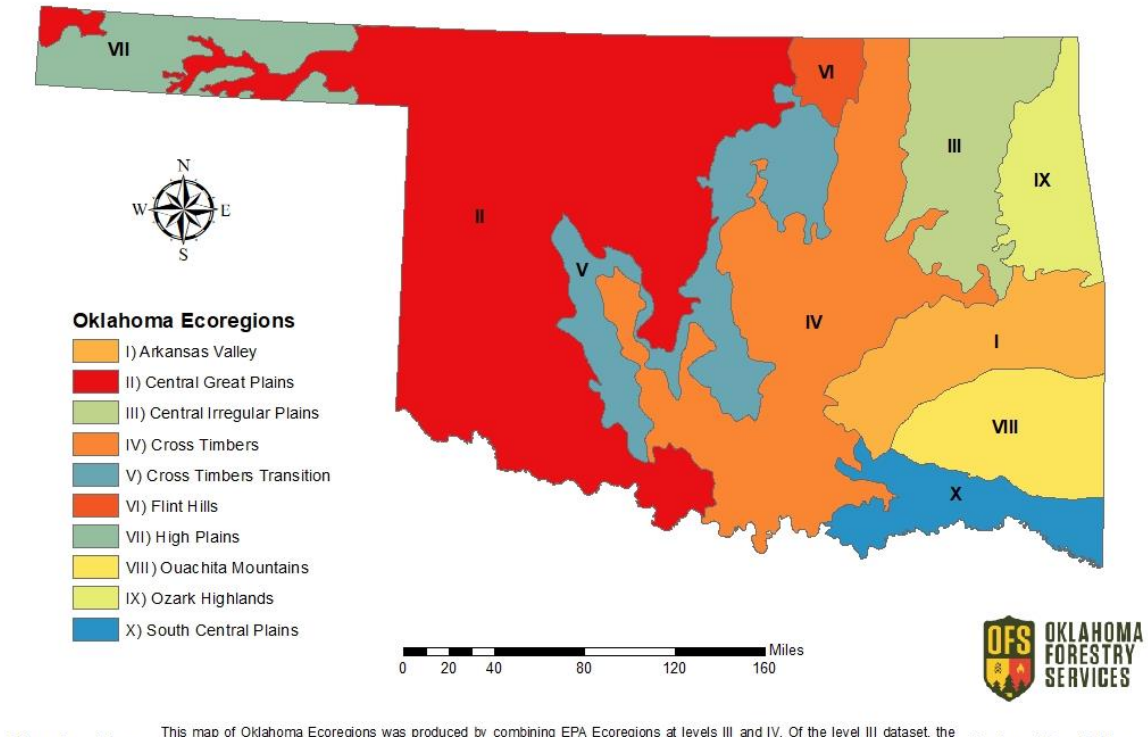


Figure 5: Oklahoma Ecoregions.

The High Plains Ecoregion

The High Plains ecoregion consists of smooth to irregular, semiarid plains that are studded with playas and stock ponds, widely mantled by loess or sand, and underlain by semi-consolidated sand and gravel deposits. Elevations range from 2,400 to 4,800 feet, and are highest in the west. Precipitation increases eastward, averages only 17 to 20 inches annually, and is erratic. Natural vegetation is mostly short grass prairie, but sagebrush–bluestem prairie is native on scattered sand plains and sand hills. Overall, natural vegetation is distinct from the mixed grass and tall grass prairies of moister ecoregions to the east. Trees are generally limited to the urban areas and the main water courses, and include cottonwood, willow, mulberry, hackberry and elm where soil moisture is sufficient. Riparian forest regeneration is often problematic due to drawdown of the water table from crop irrigation and changes in flood frequency, and cottonwoods along the Beaver River near Guymon struggle to survive.

Today, cropland (mostly winter wheat and grain sorghum) is extensive. Rangeland (widely overgrazed) is found in areas that are too sandy or steep for farming. Both cropland and rangeland require proper management to limit wind erosion. Groundwater irrigation has become increasingly common in recent decades, which has resulted in the drawing down of the Ogallala Aquifer. This has caused many streams to go dry, some to the point that no defined channels remain. The remaining streams and pools are shallow and have sandy substrates. Conditions in these intermittent streams are intensely stressful for many species of fish. As a result, both the diversity and richness of fish species are lower than in any other ecoregion in Oklahoma. The most common fishes found are the red shiner and the plains killifish.

High Plains Ecoregion Forest Inventory and Analysis

Forest Inventory and Analysis (FIA) has completed the first full cycle of measurements in the West (Oklahoma FIA units 3-7). The data collected over the last ten years indicates that Unit 6, the panhandle of Oklahoma, is habitat for 3.9 million live trees. The most common forest type groups are pinyon-juniper and oak/hickory - these two forest type groups represent over 60% of the tree population west of the 100th Meridian.

The Central Great Plains Ecoregion

The central Great Plains ecoregion is largely underlain by red, Permian-age sedimentary rocks and includes scattered hills, breaks, salt plains, low mountains (Wichita Mountains), gypsum karst, sandy flats, and sand dunes. Landform diversity is greater and elevations are lower than in the High Plains. Mean annual rainfall increases eastward, and varies from about 22 to 38 inches. Growing season increases towards the south. The upland natural vegetation in this dry, sub-humid area is mostly mixed grass prairie, but mesquite–buffalograss and shinnery oak are native. The oak savannah and Cross Timbers forests are scattered on the eastern fringes of this ecoregion and a small amount of pinyon pine and ponderosa pine can be found in the far northwest corner of the panhandle. Common tree or shrub species found include mesquite, several species of juniper and oaks. Along the area's major river systems, tree species include oak, elm, ash, cottonwood, willow, hackberry, mulberry, walnut and others. Live oak extends from Texas up into Quartz Mountain State Park. The eastern boundary of this coincides with the eastern limit of America's winter wheat belt. Cropland is extensive; main crops are wheat, alfalfa, and grain sorghum. In addition, soybeans are grown in the east, where rainfall is greatest, and cotton occurs, especially on irrigated, nearly flat land in the south. Rangeland and grassland are found in more rugged areas and are being invaded by eastern redcedar. Extensive oil and gas fields occur. Typically, after heavy rains, stream flows increase and are laden with suspended sediment. Streams draining rangeland carry less sediment load than those that are downstream of cropland. Flow stops or nearly stops in the summer, but scattered pools endure and serve as summer refuges for aquatic fauna.

Numerous streams have been channelized and/or impounded resulting in the loss of riparian forest, unnatural flow regimes, entrenchment, bank erosion, substrate alteration, and fauna

modification. Also, the invasion of salt cedar on riparian areas is threatening native forest types as well as water flow regimes. The plains killifish occurs in large numbers in some streams. The most common minnows include the red shiner, sand shiner, suckermouth minnow, and the plains minnow. The common but threatened Arkansas River shiner also occurs. Slenderhead darters are also widespread. Freckled madtoms and isolated pockets of orangethroat and dusky darters do occur. The Red River pupfish is found in pools and backwaters of sandy-bottomed streams and rivers where temperature, salinity, and alkalinity are high.

During the 1930s and 1940s, thousands of miles of shelterbelts were planted in this ecoregion under President Roosevelt's Prairie States Forestry Project. The program's very first shelterbelt in the nation was planted near Mangum in Greer County in 1935.

Central Great Plains Ecoregion Forest Inventory and Analysis

Forest Inventory and Analysis data from 2010 estimated that Central Great Plains contained 1.98 (± 9.8%) million acres of forest across central and western Oklahoma. The average numbers of trees with diameters ≥5.0" per acre was 70.1 (±10.5%). Basal area of trees ≥5.0" was 30.4 (±11.9%) feet^2/acre. Of the nearly 2 million acres of forest, 479,000 acres were in the elm/ash/cottonwood forest types group, 349,000 acres of woodland hardwoods (i.e. mesquite woodlands), 327,000 acres are in the oak-hickory forest types group, and 316,000 acres were pure eastern redcedar. In 2010, 8% (±1) of the Great Central Plains forest experienced fire disturbance.

The most recent forest area estimate (2018) reveals a decrease in total forest area – 1.67 (± 4.8%) million acres. The average number of stems at least 5" in diameter per acre is currently estimated at 73.3 (±4.8%). Basal density estimates are 34.1 (± 5.3%) feet^2/acre which is statistically unchanged from the 2010 estimate. The elm/ash/cottonwood group saw the largest of the forest types groups with a decline to 306,000 acres. Other eastern hardwoods (pure eastern redcedar) have declined slightly to 262,000 acres. Woodland hardwoods and oak hickory groups remain relatively constant at 371,000 acres and 277,000 acres, respectively. Fire disturbance has decreased to 5% (±1) in 2018.

The Cross Timbers Transition Ecoregion

The Cross Timbers Transition ecoregion consists of rough plains that are covered by prairie grasses, eastern redcedar, scattered post oak-blackjack oaks, and elms. Terrain and vegetation are transitional between the less rugged, grass-covered ecoregions to the west and the hilly, oak forest to the east. Since the early 19th century, both the abundance of upland trees and the number of tree species have greatly increased due, in part, to fire suppression. During the same period, natural riparian forests and wetlands have been degraded or lost due to channelization and land use changes. Today, land use is a mixture of rangeland and cropland.

Cross Timbers Transition Forest Inventory and Analysis

In 2010, the Cross Timbers Transition contained an estimate of 536,000 (± 20.9%) acres of forest. The average numbers of trees ≥5.0" per acre was 93.8 (±12.9%). Basal area of trees ≥5.0" was 54.5 (±13.4%) feet^2/acre. The most frequent forest types group was the oak/hickory group with 196,000 acres. Elm/ash/cottonwood forest types composed 150,000 acres while other eastern softwoods (pure eastern redcedar) made up 71,000 acres.

The 2018 FIA estimates of Cross Timbers Transitions forest area report no significant changes – the estimate of forest area is 549,000 (± 9.4%) acres. Likewise, density estimates also remain unchanged – tree density estimates are 93.6 (±6.7%) trees per acre and average basal area estimate remained steady at 50.9 (±7.5%) feet^2/acre. Oak/hickory forest types group have seen a slight increase to 232,000 acres. Elm/ash/cottonwood forest type group remain consistent at 143,000 acres as did other eastern softwoods (pure eastern redcedar) with 49,000 acres. Fire disturbance affected just 2% (±1) of Cross Timbers Transition forests in 2018.

The Flint Hills Ecoregion

The Flint Hills ecoregion includes the western edge of tall grass prairie and is dominated mostly by mixed prairie grasses and scattered oak savannahs. The topography is rolling plains, but steep bluffs occur in some valleys. Vegetation is characterized by alternating prairies, groves and strips of trees, more commonly found along water courses. The upland forest is dominated by oak and hickory, with cottonwood, willow and elm occurring along streams or on better soils. Eastern redcedar is encroaching onto range and forestlands where fire has been excluded. This ecoregion is used primarily for grazing. Cropland is restricted to river valleys and stone-free uplands. Mean annual precipitation is 38 to 42 inches. Springs are common enough to increase summer base flow in some streams.

Flint Hills Forest Inventory and Analysis

Forest land in the Flint Hills covered an estimated 161,000 (±39.6%) acres. The average numbers of trees ≥5.0" per acre was 111.5 ±26.32%. Basal area of trees ≥5.0" was 46.8 (±24.9%) feet^2/acre. In 2010, 25% (±18) of the Flint Hills forest experienced fire disturbance. Flint Hill forest area estimate in 2018 was lower (although not statistically significantly lower) at 85,000 (±24.7%) acres. Tree density estimates have changed, although not statistically significantly, to the current estimate of 96.7 (±17.6%) trees per acre. Basal area remains statistically unchanged at 52.1 (±6.7%) feet^2/acre. The benefit of years of inventory allow some analysis of forest type groups in 2018. Nearly all the forest in the Flint Hills is composed of oak/hickory forest type group (42,000 acres) and elm/ash/cottonwood (33,000 acres). Fire disturbance affected 21% (±10) of the Flint Hills forests in 2018.

The Cross Timbers Ecoregion

The Cross Timbers ecoregion was once part of the Gulf Coastal Plains. The region's topography is generally flat to rolling hills. The vegetation is a mix of forests, prairie and savannah, and is a transition zone between the pine forests of the eastern ecoregions and the prairies of the drier, western ecoregions. The region is known for the "Cross Timbers," a large scrubby forest dominated by post oak and blackjack oak and tall grass prairie. Hickories become more common in the eastern fringes of this area. Riparian forests along streams support American elm, sugarberry, pecan, and other deciduous species. In this region, the Caddo Canyons, located in Canadian and Caddo counties, are products of deep erosion into Permian sandstone. The resulting micro-environment sustains populations of Caddo Maple (*Acer saccharum)* and other deciduous forest species (Hoagland, 2000). Eastern redcedar and Ashe juniper are the dominant evergreen species, and are encroaching onto range and forestlands due to the lack of fire and increase in passive or "recreational" land ownership. Ashe juniper dominates the rugged Arbuckle Mountains. The utilization of eastern redcedar is increasing as the species and forest products industry develops, but is considered an aggressive pest by most people. A localized population of Seaside Alder (*Alnus maritima*) occurs along Tishomingo and Blue Rivers and other streams within Johnston and Pontotoc counties in far southern Oklahoma (Little). Its only other occurrence is in Delaware and Maryland. Gully erosion is common on abused soils.

A mix of savannah, forest, and prairie is native to the low hills, cuestas, ridges, and plains, and separates the forests of eastern ecoregions from the prairies of drier, western ecoregions. The boundary between the Cross Timbers and the nearly treeless Central Great Plains coincides with the western limit of many mammals and insects. Post oak–blackjack oak forests and savannahs are native on porous, course-textured soils derived from sandstone; the percentage of blackjack oak increases westward. Tall grasses are native on fine-textured, moisture deficient soils derived from limestone, shale, or marl. Today, forest, rangeland, pastureland, and several extensive, but declining, oil fields occur. Abandoned, depleted farmland is common. The remaining cropland is largely restricted to valleys near channelized streams whose degraded habitat supports very poor assemblages of aquatic fauna.

Two types of streams are common. The first is characterized by a mixture of shaded riffles, runs, and pools that have gravel or cobble substrates. The second stream type has lower gradients and is found downstream of the first; it is characterized by wide, shallow, sand-choked channels. In the summer, surficial flow is often absent from wide, sandy, lower reaches. Erratic stream flow has led to the construction of many reservoirs. Generally, stream conditions are more stressful for fish than in eastern Oklahoma, but less rigorous than in the west. Common minnows include the red, sand, and redfin shiners and the suckermouth minnow. The redfin and orangethroat darters, smallmouth buffalo, river carpsucker, black and golden redhorses, and channel and flathead catfishes occur in many streams.

Cross Timbers Forest Inventory and Analysis

An iconic Oklahoma forest, the Cross Timbers ecoregion forest spanned an estimated 3.61 (±6.09%) million acres in 2010. The average numbers of trees ≥5.0" per acre was 104.2(±5.41%). Basal area of trees ≥5.0" was 45.7 (±6.39%) feet^2/acre. Deciduous forests covered well over 70% of this area, with 2.76 million acres of oak/hickory forest type group. Elm/ash/cottonwood forest types accounted for 435,000 acres, while 132,000 acres were pure eastern redcedar forest type. In 2010, 7% (±2) of the Cross Timbers forest experienced fire disturbance.

In 2018, the Cross Timbers area estimate remains relatively constant at 3.48 (±2.8%) million acres. The cross timbers density estimates remain relatively high at 110.5 (±11.87%) trees at least 5 inches DBH per acre. Basal area also remains constant at 49.8 (±2.6%) feet^2/acre. Also unchanged, the oak/hickory forest type group is the largest by area – 2.63 million acres. Elm/ash/cottonwood forest type group is unchanged with an estimated 432,000 acres and other eastern softwoods (pure eastern redcedar) holds relatively constant at 125,000, and oak/pine (mixed eastern redcedar and hardwood) covers 123,000 acres. In 2018, 9% (±1) of Cross Timbers forests had some type of fire disturbance.

The South Central Plains Ecoregion

The South Central Plains ecoregion is an irregular, forested plain cut by shallow valleys and underlain by poorly-consolidated deposits. Mean annual rainfall in this humid region varies from 45 to 55 inches, and increases eastward. It is dominated by medium-tall to tall forests of broadleaf deciduous and needle leaf evergreen trees. Lying along the western edge of the southern coniferous forest, loblolly pine dominates the wetter soils of the floodplain while shortleaf pine is native to the uplands. Common associates include oak, hickory, sweetgum, blackgum, red maple, flowering dogwood and winged elm. Summer flow in many small streams is limited or nonexistent, but enduring, deep pools usually occur. Species richness markedly increases towards the east as more fauna from the Mississippi Valley are encountered. In addition, downstream influences of the Ouachita Mountains on aquatic flora and fauna occur. Sunfishes, catfishes, gars, crappies, grass pickerels, orangebelly darters, and bigeye, ribbon, striped, and redfin shiners are common. Redhorses and creek chubsuckers are numerous in small and medium size streams. The smallmouth bass is an important game species.

In southern McCurtain County, bottomland and wetland forests, oxbow lakes and cypress swamps occur. The southern oak-pine forest of southeastern Oklahoma is the most valuable forest for commercial use. In addition to their commercial value, these forests also provide some of the best wildlife habitat and high quality water resources. The region's forests also provide outstanding scenic values, supporting a strong hunting and fishing, and tourism industry.

South Central Plains Forest Inventory and Analysis

The South Central Plains forest spanned an estimated 899,000 (±7.4%) acres in 2010. The average numbers of trees ≥5.0" per acre was 95.1 (±6.38%). Basal area of trees ≥5.0 inches was 52.4 (±6.25%) feet^2/acre. This ecoregion's forest was dominated by the oak/hickory forest types group with over 499,000 acres. Elm/ash/cottonwood forest types group composed

136,000 acres of forest land in 2010. Loblolly/shortleaf pine forest types group covered 130,000 acres. In 2010, 4% (±2) of the South Central Plains forest experienced fire disturbance.

Eight years later in 2018, the FIA forest area estimate for the South Central Plains remains statistically unchanged at 841,000 acres (±7.5%). Density metrics are also statistically static. Estimates for stem density are currently 108.6 (±6.1%) trees/acre. Basal area estimates hold steady at 58.7 (±6.1%) feet^2/acre. Oak/hickory forest types group continue to dominate the ecoregion with 438,000 acres. Also unchanged, the elm/ash/cottonwood forest types group cover 109,000 acres and loblolly/shortleaf pine area hold steady at 115,000 acres. The South Central Plains forest was 4% (±2) burned by wildfire in 2018.

The Ouachita Mountains Ecoregion

The Ouachita Mountains ecoregion supports oak-hickory and pine forests. The forested low mountains are characteristically underlain by folded, sedimentary rocks of Paleozoic age. The mean annual rainfall in this humid ecoregion is 43 to 57 inches. This ecoregion remains mostly forested, but pastureland and hayland occur in wider valleys. Logging and recreation are major land uses.

The primary overstory species include southern red oak, black oak, white oak and hickories. The western fringes of the southeastern pine forest constitute nearly half of the forest cover, with shortleaf dominating the uplands. Extensive pine plantations consist primarily of the faster-growing loblolly pines. The drier sites are dominated by oak, hickory and shortleaf pine. The tallest mountains support a variety of tree species, including cove hardwoods and stunted oaks where extremes of temperature and precipitation limit growth. A variety of hardwood species dominate the bottomlands along rivers and streams. Most streams have gravel, cobble, boulder, or bedrock substrates but a few have sandy bottoms. Common fishes include the longear and green sunfishes, yellow bullhead, brook silverside, blackstripe and blackspotted topminnows, largemouth bass, smallmouth bass, redfin darter, suckers, and the bigeye, Ouachita Mountain, and ribbon shiners. Orangebelly darters, grass pickerels, and tadpole madtoms are also found. The Red-cockaded woodpecker is an endangered species found in this region.

The forests of the region also support a well-developed forest products industry, diverse wildlife habitats and the highest quality water in the state. The region's forests also provide outstanding scenic values, supporting a strong tourism industry.

Ouachita Mountains Forest Inventory and Analysis

The Ouachita Mountains ecoregion contained an estimated 2.17 (±3.82%) million acres of forest in 2010. The average number of trees ≥5.0" per acre was 131.7 (±3.13%). Basal area of trees ≥5.0" was 58.9 (±3.09%) feet^2/acre. This ecoregion contains some of the most productive timber land in the state. The net annual growth to annual removal ratio was 1.7 (±0.7) in 2010, indicating that more growth is taking place than harvesting. Of the more than 2 million acres, 870,000 acres of forest were in the loblolly/shortleaf forest types group – including native shortleaf pine stands and managed loblolly plantation. Oak/hickory forest type group had equal share of forest types group with 890,000 acres. The transition forest group type of oak/pine covered 343,000 acres. In 2010, 14% (±2) of the Ouachita Mountains forest experienced fire disturbance.

The 2018 Ouachita Mountains ecoregion forest area estimates remain statistically unchanged at 2.22 (±3.63%) million acres. The number of trees per acre increased significantly to 141.9 (±3.4%) per acre. The basal area per acre did not statistically differ from 2010 – the 2018 estimate is 63.3 (±2.9%) feet^2/acre. The net growth to removals ratio is 1.3 (±0.2), statistically unchanged from 2010. Loblolly/shortleaf pine forest types group estimates grew to 975,000 acres. The oak/hickory forest types group shrank to 748,000 acres. The oak/pine forest types group grew slightly to 391,000 acres. Fire disturbance was recorded in 15% (±2) of the Ouachita Mountains forest in 2018.

The Arkansas Valley Ecoregion

The Arkansas Valley ecoregion separates the Ozark Plateau from the Ouachita Mountains. It is characteristically transitional and diverse. Plains, hills, floodplains, terraces, and scattered mountains all occur; the terrain is distinct from nearby ecoregions. A mix of prairie, oak forest, oak–pine forest, and oak–hickory forest is native on uplands. Bottomland hardwood forest is native on floodplains and low terraces. Bottomland hardwood forests of elm, sycamore, oak, maple, ash, pecan, sweetgum and walnut dominate the floodplains unless cleared for croplands and pasture. Shortleaf pine is the native evergreen species, although loblolly pine is more frequently planted. Today, steep slopes are forested and used for timber, grazing, or recreation. Gently sloping uplands are used as pastureland or hayland. Cropland or pastureland occurs on most bottomlands. Other main land uses include poultry farming, coal mining, and natural gas production. Land use tends to be the primary factor influencing stream quality. Coal mining is an important land use, and surface and water quality impacts are common.

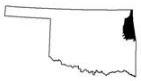
Fish communities usually contain many sensitive species; a sunfish- and minnow-dominated community exists along with large numbers of darters and catfishes. Common fishes include the bigeye, steelcolor, and redfin shiners, the orangethroat and redfin darters, and suckers including the creek chubsucker, golden and black redhorse, river carpsucker, spotted sucker, and smallmouth buffalo. Summer flow in small streams is often limited or nonexistent.

Arkansas Valley Forest Inventory and Analysis

Arkansas Valley forest land covered an estimated 1.54 million acres (±7.0%) in 2010. The average numbers of trees ≥5.0" per acre was 115.5 (±3.83%). Basal area of trees ≥5.0" was 51.3 (±3.7%) feet^2/acre. The majority forest type group was oak/hickory, with 1.07 million acres of forest land. An additional 139,000 acres of forest were in the oak/pine forest type group. Elm/ash/cottonwood constituted 96,000 acres of forest. In 2010, 12% (±2) of the Arkansas Valley forest experienced fire disturbance.

Forest area estimates from 2018 reveals a small decline in forest size 1.40 (±5.7%) million acres. However, the number of tree stems per acre have increased to 125.9 (±3.1%). The basal area also grew to 59.0 (±3.6%) feet^2/acre. Declining, the oak/hickory forest shrank to 941,000 acres. The elm/ash/cottonwood forest types group significantly grew to 137,000 acres while the oak/pine forest types remain stable at 134,000 acres. The ratio of acres burned in 2018 remained statistically unchanged from the 2010 estimate – 14% (±2).

The Ozark Highlands Ecoregion



The Ozark Highlands ecoregion is a level to highly dissected plateau composed of flat-lying, cherty limestone and dominated by the oak-hickory-pine forest type. Mean annual rainfall in this humid ecoregion is 41 to 49 inches. The forests are medium-tall to tall, and become savannah-like in parts of the region. Dominant species include post oak, white oak, red oak, black oak, bitternut hickory and shagbark hickory. On better soils, black walnut, pecan, elm, sycamore, ash and other species occur. Hickory becomes less common in the western parts of the area with Shortleaf Pine common in the eastern parts of the area. The extension of this forest into Oklahoma is unusual because it contains sugar maple, beech and basswood, species more commonly found much farther east. Today, rugged areas are forested and nearly level sites are pastureland or hayland. The main land uses are logging, recreation, and especially, poultry and livestock farming. Rapid suburbanization, intensive grazing, and fields receiving waste from poultry farms have significantly increased fecal coliform, phosphorus, and nitrite-nitrate concentrations in receiving waters.

A well-developed forest industry taps the resource for a variety of products, including hardwood lumber, railroad ties, pallets, and specialty products. Protection of water quality, scenic views and wildlife habitat are important considerations for forestry activities. Several high quality and designated scenic rivers occur in the area and support a large recreational industry, and numerous man-made reservoirs provide drinking water and recreational opportunities for Tulsa

and surrounding communities. Karst features are common and numerous caves support a variety of rare species such as Gray and Ozark Big-eared bats, and the Ozark cavefish.

Both habitat diversity and species richness are high, and sensitive fish species are common. Minnows, sunfishes, and darters are plentiful. The banded sculpin and slender madtom occur in small streams, especially where aquatic macrophytes are present, and the southern redbelly dace inhabits headwaters. The shadow bass is nearly limited to the region. Other common fishes include the orangethroat darter, stippled darter, greenside darter, fantail darter, northern hogsucker, white sucker, Ozark minnow, cardinal shiner, and bigeye shiner. The most important game species is the smallmouth bass.

Ozark Highlands Forest Inventory and Analysis

Forest Inventory and Analysis estimated 1.09 (±4.4%) million acres of forest land covered the Ozark Highlands in 2010. The average numbers of trees ≥5.0 inches per acre was 122.1 (±2.9%). Basal area of trees ≥5.0" was 66.9 (±3.3%) feet^2/acre. More than 951,000 acres of the Ozark Highland forest were in the oak/hickory forest type group. Elm/ash/cottonwood forest land accounted for 57,000 acres while 36,000 acres of forest land were in the oak/pine forest type group. In 2010, 13% (±2) of the Ozark Highland forest experienced fire disturbance.

In the most recent inventory year, 2018, the area of forest in the Ozark Highland ecoregion remains stable at 1.06 million acres (±4.3%). The density of stems at least 5 inches in diameter remains unchanged at an estimated 120.4 (±3.4%). Basal density is also unchanged with current estimates putting the average basal area.at 68.5 (±3.3%) feet^2/acre. The oak/hickory forest types group contracted to just 883,000 acres, a significant decline. Elm/ash/cottonwood held steady at 54,000 acres as did the oak/pine forest types cover at 44,000 acres. The estimate of percent of forest burned in 2018 in the Ozark Highlands is unchanged from 2010 at 15% (±3).

The Central Irregular Plains

The Central Irregular Plains ecoregion is a belt of prairie that separates the Cross Timbers from the Boston Mountains and the Ozark Highlands. Interbedded Pennsylvanian-age shale, sandstone, limestone, and coal occur; the alternating hard-soft strata dip westward, forming nearly flat to irregular plains, low hills, and east-facing cuestas. It is dominated by tall grass prairie with forests of post oak, blackjack oak, and black hickory native to rocky hilltops. The topography is rolling plains, but steep bluffs occur in some valleys. Today, this ecoregion is a mix of rangeland, grassland, forest and farmland; cropland is most extensive on nearly level plains. Cottonwood, willow, pecan, sycamore, hackberry, oaks and elm dominate the riparian forests along streams. Eastern redcedar is encroaching onto range and forestlands where fire has been excluded.

Rivers and streams typically have low gradients, slowly moving water, muddy banks, and meander in wide valleys. Stream substrates and habitats vary from a high quality, variable mix of conditions to silt- and mud-choked channels. Runoff from bituminous coal mining has degraded water quality and affected aquatic biota in a few streams. The redfin shiner, suckermouth minnow, redfin and orangethroat darters, smallmouth buffalo, river carpsucker, black and golden redhorses, spotted suckers, yellow and black bullheads, and flathead catfish occur.

Central Irregular Plains Forest Inventory and Analysis

The Central Irregular Plains contained an estimated 616,000 acres (±16.5%) of forested land in 2010. The average numbers of trees ≥5.0 inches per acre was 112.8 (±10.9%). Basal area of trees ≥5.0 inches was 63.4 (±14.7%) feet^2/acre. Of all forested area, 335,000 acres were oak/hickory forest type group. Elm/ash/cottonwood accounted for 271,000 acres. In 2010, 0% of the Central Irregular Plains forest experienced fire disturbance.

The Central Irregular Plains saw a significant decline in forest area to 541,000 (±9.3%) acres in 2018. The density of tree stems per acre also declined, now estimated to be 94.3 (±6.8%). The basal area estimate of 51.3 (±8.2%) feet^2/acre was less than the 2010 estimate but there

was no statistical difference between the estimates. Oak/hickory forest types group declined to 291,000 acres and elm/ash/cottonwood forest types group declined to 218,000 acres. The fire disturbance percent area estimate in 2018 is 2% (±1), a statistically small increase from 2010.

A Short History about Oklahoma's Forests

In the early 1800s, all of current Oklahoma except the panhandle (No Man's Land) was Indian Territory. Several tribes of the Plains Indians occupied parts of this region. These lands were where the Five Civilized Tribes from the southeastern United States were forced to relocate. In 1890, the land the Indians were occupying was reduced again to the eastern portion of the current State of Oklahoma and the western portion was known as the Territory of Oklahoma. Between the years of 1889 and 1895, the government opened the western portions of the territory, Oklahoma Territory, to settlers by holding six land runs. On November 16, 1907, Oklahoma Territory and Indian Territory were combined to establish the 46th state, Oklahoma.

A land survey was conducted during the years of 1895 to 1898, by the United States Geological Survey, on the lands of the Cherokees, Creeks, Seminoles, Choctaws, and Chickasaws. The Indian lands of the Quapaw Agency, in the far northeast corner, were not included in the survey because many of the lands had long since been subdivided. There is a report which includes general descriptions of all the townships and ranges found within the Indian Territories. The descriptions include types of tree species found, site types, and sawmill locations. The lands occupied by the Five Civilized Tribes contained an area of 19,622,000 acres which is approximately 45 percent of the current land acreage of Oklahoma. This land survey, conducted more than 100 years ago, determined there were 12,112,000 forested acres within the Indian Territory. Figure 9 is a map of this region based upon this survey.

Native Americans occupied most of Oklahoma originally some 10,000 to 20,000 years ago. These tribes brought some agriculture and burning to the area, as noted by Spanish and French explorers and traders who visited the region as early as the mid-1500s. Subsequently, many eastern tribes were forced to relocate to the Indian Territory around the 1820s by numerous routes, the most famous being the Cherokee "Trail of Tears." Oklahoma's forests were shaped to a great extent by the activities of these early people.

European settlement began to increase in the region following the Civil War (1861-1865). By the 1930s less than 200,000 acres of virgin forest in eastern Oklahoma remained. Although sawmilling came to Oklahoma with European settlers, likely around 1880, it was the Dierks family that actually brought modern forestry to the Territory very early in the 20th Century.

Peter Henry Dierks immigrated to the United States from Germany in 1852, and settled in Iowa, where he took up farming. By the early 1880s, two of his sons, John and Herman, had left farming and entered the lumber business. The Dierks brothers expanded their operations with railroads as settlement moved west. By 1896, the Dierks operated 15 retail lumberyards in Iowa and Nebraska. As demands for lumber increased throughout the region, their search for new supplies of wood intensified.

By this time, small sawmills were already infiltrating Indian Territory, where a perceived "unending supply" of trees provided lumber, timbers, railroad crossties, barrel staves, and other essential products. Surveyors of the U.S. Geological Survey actually noted the locations of many of these mills when they surveyed the Territory in the late 1890s.

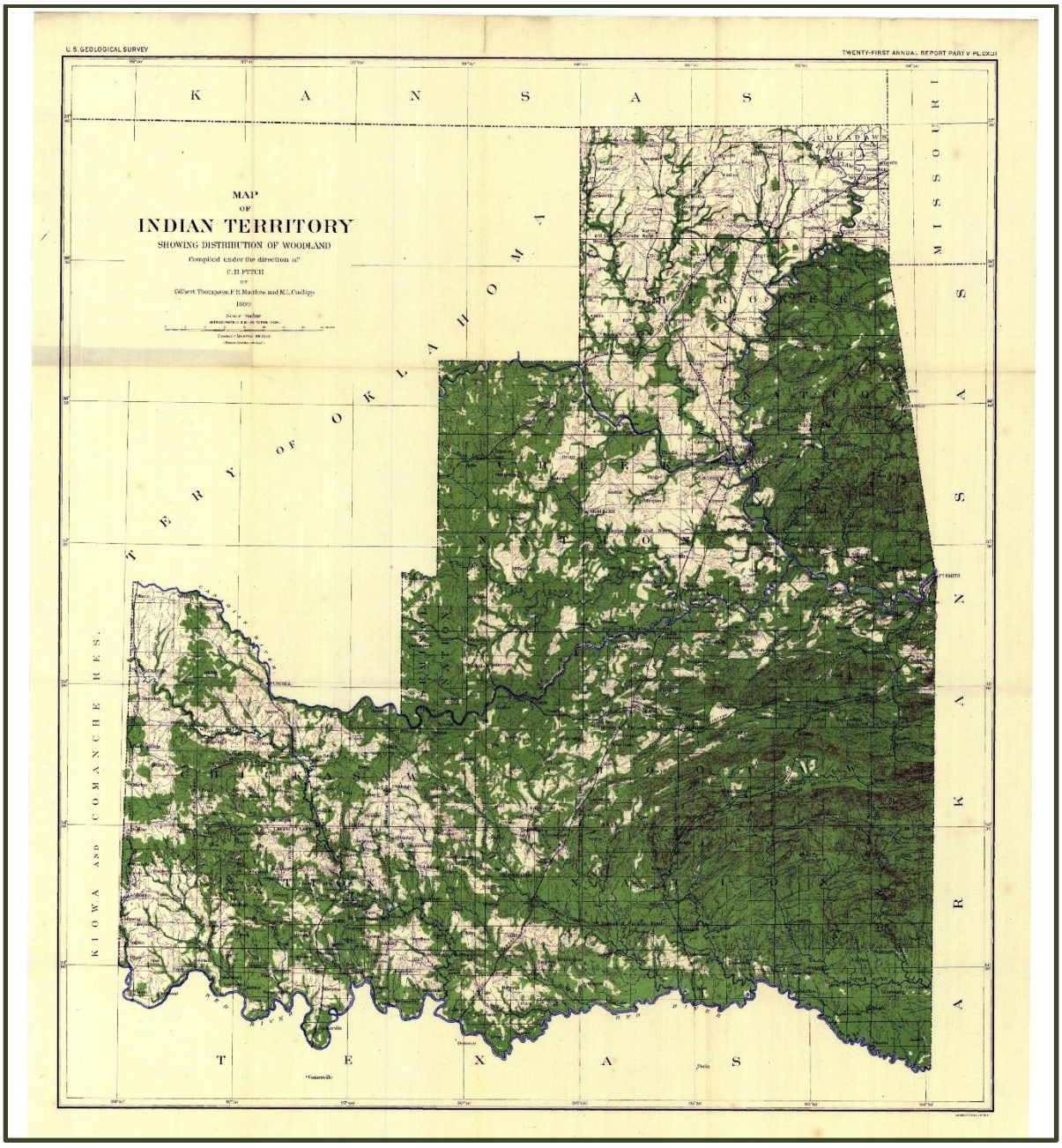
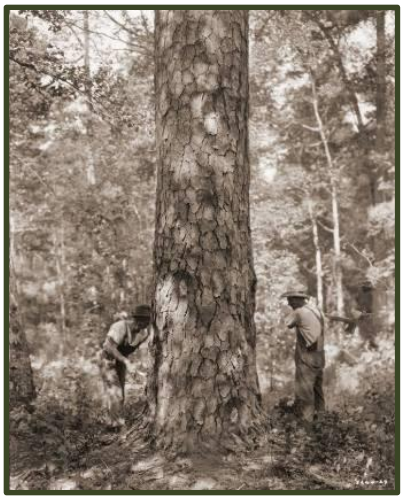


Figure 6: Historic map of eastern and parts of central Oklahoma's forests.

Source: Woodlands of Indian Territory, C.H. Fitch, 1899. The icon illustrates the area of Oklahoma represented.

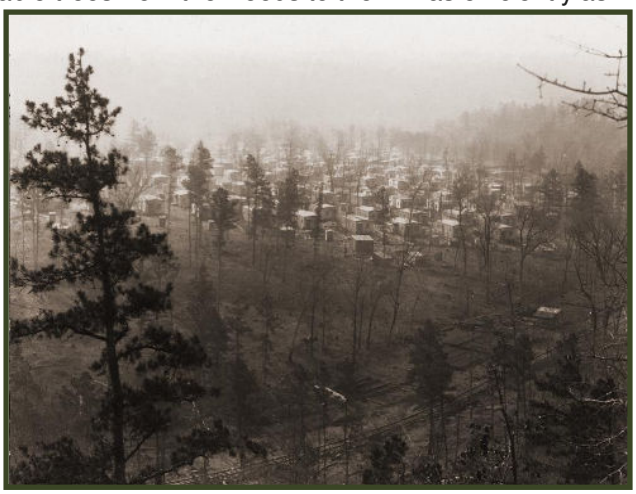
As wood supplies dwindled in the Midwest, brothers Hans and Herman Dierks learned of vast, unharvested timberlands in Indian Territory. In 1898, they became involved with a lumber planing mill at Petros, a small village near present-day Heavener, Oklahoma. In 1900, they purchased a sawmill with dry kilns, a planer, and five miles of logging railroad at DeQueen, Arkansas, and began to harvest trees from the area and process lumber for their retail lumberyards that soon numbered twenty.



Soon after, the Dierks Lumber & Coal Company expanded its operations into Indian Territory, where it operated as the Choctaw Lumber Company. In 1903, they purchased their first tract of land in the Territory, near Valliant. In 1907, a Dierks survey crew traveled about 8 miles northeast from Valliant for the purpose of locating the site for a new large sawmill to be built at Bismark (later renamed Wright City). By 1910, the sawmill at Bismark was up and running. Felling trees in the forest and cutting them into logs was hard work, accomplished with axes, a two-man crosscut saw and two strong backs. To move the logs from the woods to the mill, Dierks extended railroads and temporary spur lines into the forest. Teams of oxen (up until 1921) and, later on, mules pulled the loaded wagons to the nearest siding.

As the timber harvest moved farther away from the mills, the daily commute for the workers grew excessive. Dierks developed the concept for a roving camp that would house the workers in the forest but which could be moved when timber had been cut out. The “traveling timber town” idea was born. A town consisted of about 200 homes for 800 workers, and included a school, church, water tower, the company store, and even a movie theater. Between 1910 and 1968, Dierks’ timber towns were set up in ten locations in Oklahoma, including seven different sites for the Post Office at Clebit.

On “moving day” houses were cut in half and loaded onto railcars (trucks were used later) for transfer and reassembly at the next town. Initially, Dierks’ timber harvesting philosophy mirrored large companies elsewhere – get all merchantable trees from the woods to the mill as efficiently as possible, and don’t worry about the future. However, in 1915 the Company significantly changed its philosophy, and began to leave seed trees to reforest their lands. By the early 1920s, Dierks had begun a fire control program with observation towers, fire wardens, and telephone lines. They began hiring professional foresters in the 1920s, and worked closely with the Oklahoma Forest Commission (now Oklahoma Forestry Services) established in 1925. The Commission strengthened the wildfire control program and began programs in seedling production and education that helped restore the State’s forests.



For more than 60 years, Dierks remained the largest forest industry in Oklahoma, managing 1.8 million acres of timberland and operating six large sawmills in the Oklahoma – Arkansas region. The Weyerhaeuser Company purchased the lands and operations of the Dierks Forests, Inc. in 1969, and started a new chapter in Oklahoma’s colorful forest history.

Another man in Oklahoma's forest history was Elbert Little, Jr., who studied several forest sites in southeast Oklahoma over a 60 year period and described the burned out and cutover woods he first witnessed in 1930 as "almost worthless for any purpose and it would be some time before it was of any value."

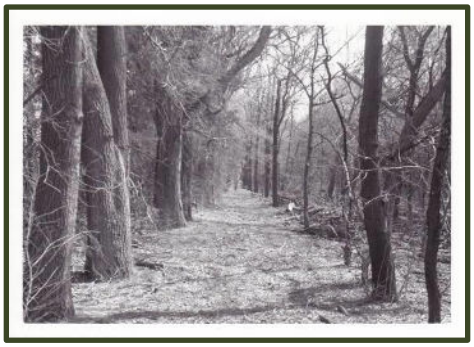
By the 1980s, when Little revisited the area, he reversed his earlier position about the worthlessness of the land. He wrote that he wished he owned some of it. "The progress in management of southeastern Oklahoma's forest lands is far greater than anyone would have predicted a half century ago," he wrote. "The changes, mostly beneficial, are beyond anyone's imaginations or dreams."

There are still some forest tracts and trees spread throughout Oklahoma that are said to be the last of the remaining "virgin forests" in the South. Most of these tracts can be found in central Oklahoma within the post oak-blackjack oak forest type, commonly known as the "Cross Timbers." The Cross Timbers is one of the least disturbed forest types left in the eastern United States. Thousands of ancient post oaks can still be found within this forest type. Many public and private land managers and owners do not realize that ancient forests survive across the rugged terrain of the Southern Plains, because the Cross Timbers do not satisfy the stereotype for ancient forests. People are fixated on ancient forests being like the giant redwoods or massive hardwoods. The Cross Timbers are drought stressed forests, populated by low stature, slow growing trees, many of which predate not only statehood, but also the birth of the United States. Thousands of 200- to 400- year old post oaks survive as well as redcedar trees over 500 years old have also been found on fire-protected bluff lines (Stahle).

Washington Irving traversed the northeast parts of the Cross Timbers in Oklahoma back in the autumn of 1832. Irving described the Cross Timbers as "rough country of rolling hills, covered with scattered tracts of post oak and blackjack oak; with some intervening valleys." His travels through the forests were, "like struggling through forests of cast iron." Irving did proclaim, "The whole tract may present a pleasant aspect in the fresh time of the year, when the ground is covered with herbage; when the trees are in their green leaf, and the glens are enlivened by running streams." But unfortunately they were traveling during late October when the "herbage was parched; the foliage of the scrubby forests was withered; the whole woodland prospect, as far as the eye could reach, had a brown and arid hue." He even described the streams as being dried up (Irving 1835).

History of Western Oklahoma Forests

Western Oklahoma, along with most prairie states, from Texas to Canada, has always had few forests, especially along the waterways, on ridges, and in canyons. During the late 1800s and early 1900s, many people, accustomed to the protection and shelter of forests were moving to western Oklahoma. In the early to mid 1900s, times were hard across much of the United States especially the prairie states. These states were experiencing drought and dust storms. Many people abandoned their lands as crops failed and moved to California. However some pioneer families made an effort to establish trees for protective purposes. Americans from eastern states and immigrants from forested regions of Northern Europe joined American settlers moving west in planting trees for security and protection. The Great Depression of the 1930s set the stage for "the greatest afforestation program the world has known" when the Forest Service



was given the task of planting shelterbelts from Texas to Canada in a zone a hundred miles wide. The venture, known as the Prairie States Forestry Project or the Shelterbelt Project, resulted in the planting of millions of trees between 1934 and 1942.

In Oklahoma alone, about 20 million trees were planted in 3,000 miles of shelterbelts, on over 5,000 farms. The very first shelterbelt planted under this program was near Mangum, Oklahoma, in 1935. Many of these shelterbelts and windbreaks still exist throughout the prairie states. The millions of trees planted in the depression thirties stand as a monument to President Franklin D. Roosevelt, who originated the idea of the project. Farmers across this region still plant trees to help protect their farmland from erosion, wind, and blowing snow.

Oklahoma's Diverse Forest Types

As defined by the USDA Forest Service and the Oklahoma Forestry Code, forestland is land at least 10% stocked by forest trees of any size (whether of commercial or non-commercial species) or formerly having such tree cover and not currently developed for non-forest uses, with a minimum area classification of 1 acre. Oklahoma's forests are diverse and provide numerous values and benefits to the state. The trees found throughout Oklahoma's forests range from less than 10 feet tall to greater than 100 feet tall. Some of the smallest trees in the state are actually part of the last ancient forests found in the south.

Elbert Little's *Forest Trees of Oklahoma* book describes 164 tree species found in the state, of which 143 are native and 21 introduced. There are about 14 rare trees that can be found only in small areas or a single county within the state. Some of these trees include seaside alders in Johnston and Pontotoc counties, Caddo maple in Caddo and Canadian counties, Texas ash and short-lobe oak in the northern Arbuckle Mountains, and little walnut and Texas live oak in the Wichita Mountains. These rare trees as well as a variety of other forest trees grow throughout the state and make up nine different forest types. The nine different forest types that exist in Oklahoma are described in more detail throughout this section:

- **Shortleaf Pine Forest Type**
- **Loblolly Pine Forest Type**
- **Oak – Hickory Forest Type**
- **Oak – Pine Forest Type**
- **Post Oak – Blackjack Oak Forest Type**
- **Bottomland Hardwood Forest Type**
- **Pinyon Pine – Juniper Forest Type**
- **Eastern Redcedar Forest Type**
- **Community Forest Type**

Shortleaf Pine Forest Type

In pure softwood forest types, the softwood component stocking needs to be greater than 50%.

Shortleaf pine is the most wide-spread of any pine in the southeastern United States appearing in 22 states. This fire-dependent forest type was once more common on the Gulf Coastal Plain soils found in the southeast counties of the state, but shortleaf pine trees have been replaced on good sites by loblolly pine plantations or land use has been changed to agriculture. Currently, pure shortleaf pine forest type (forests with at least 50% basal area of shortleaf pine) is estimated to occupy 524,131 acres of land across Oklahoma (SE±.49,477). This represents just a 20,000 acre difference from the 2015 estimate of 544,535 acres of shortleaf pine.

This forest type is now found on some of the more rugged relief of the state where it is more competitive on drier sites with thin, rocky, and nutrient deficient soils. Throughout the region understory vegetation is now dominated by woody species, and once-common grasses and forbs are scarce.

Shortleaf pine forests also provide habitat to a variety of wildlife species. Shortleaf pine seeds are an important food source for birds and small mammals. Deer browse on seedlings. Stands of seedlings and saplings provide cover for bobwhite quail and wild turkey. Old-growth shortleaf pine provide habitat for cavity dwellers such as the endangered Red-Cockaded Woodpecker. The shortleaf pine forest type does provide quality lumber but is not as commonly planted because it is a slower growing tree than loblolly pine.

Table 1: Shortleaf pine forest type.

Dominant Species	Primary Associates	Sites
Shortleaf Pine	White oak, southern red oak, black oak, hickory, post oak, blackjack oak, blackgum, red maple	low, well drained ridges to rocky, dry, south slopes, and the better drained spur ridges on the north slopes and also on old fields

Source: USDA Forest Service: Oklahoma Forest Inventory and Analysis Data

Loblolly Pine Forest Type (Native/Plantation)

In pure softwood forest types, the softwood component stocking needs to be greater than 50%.

This forest type is extensive and occurs naturally on the Coastal Plain across the southeastern United States. Loblolly pine forest type is native to the southeastern corner of Oklahoma, but extensive planting has extended the range throughout eastern Oklahoma. 2018 FIA estimates of pure loblolly pine stands (at least 50% basal area of loblolly pine) was 682,399 acres (SE±57,321). This new estimate does not differ by much from the 2015 estimate of 659,430 loblolly forest acres.

This forest type occurs on a variety of soils, both uplands with good drainage and on somewhat poorly drained flatwoods. Wherever a seed source has been available loblolly pine has colonized abandoned fields, areas laid bare by severe cutting or fire, and even badly eroded sites. Abundant but not excessive soil moisture is required for good growth of loblolly pine. Loblolly pine is only moderately tolerant of shade and can suffer from hardwood root competition.

This forest type tends to merge with shortleaf pine as well as oak-pine forest types on drier sites. Since this forest type is mostly found where soil moisture is favorable, the associated undergrowth is rich in species and in numbers. Understory trees include sweetgum, black cherry, flowering dogwood, American holly, sassafras, hawthorn, and fringetree. Characteristic shrubs and vines are beautyberry, yaupon, poison ivy, greenbriers, blackberries, and grape. Dense young stands support only sparse herbaceous vegetation, but as stands open up many such plants appear, among them bluestem and panicums.

Loblolly pine is the most commonly planted tree for timber harvest because it is fast growing and produces quality lumber and fiber. This lumber and fiber is used for many products including paper, furniture and home construction.

Table 2: Loblolly pine forest type.

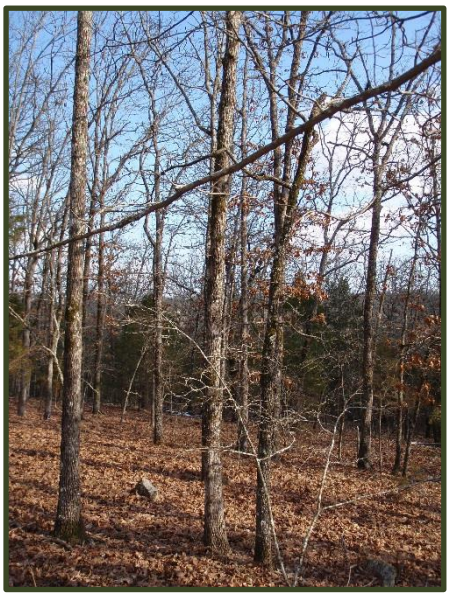
Dominant Species	Primary Associates	Sites
Loblolly Pine	Sweetgum, southern red oak, post oak, blackjack oak, blackgum	upland soils with abundant moisture but good drainage, and on poorly drained depressions

Source: USDA Forest Service: Oklahoma Forest Inventory and Analysis Data

Oak-Hickory Forest Type Group

In the hardwood forest types, the softwood component stocking needs to be less than 25%.

The oak-hickory forest type is located largely in the northeastern portion of the state and includes the highlands referred to by most writers as the Ozark Mountains. The 2018 area estimate of the oak-hickory forest type group area was 6,485,068 acres (SE±162,126) - 308,428 smaller than the 2015 estimate of 6,793,496 acres.



Major vegetational trends from east to west include an increasing importance of oaks, particularly post oak, and a reduction in canopy tree species diversity. Mesic sites and vegetation are more restricted in the western part of the range, particularly with decreased precipitation and increased incidence of drought and fire. Pines increase in importance from north to south. Oak-hickory merges with oak-pine as you go south and as you go west, it grades into post oak-blackjack oak forest (Cross Timbers).

There are many different hardwood tree species that are associated with this forest type including blackjack oak, post oak, white oak, red oak, pin oak, black oak, hickory, and winged elm. The ground cover is composed of a mixture of huckleberry, coralberry, sassafras, big bluestem, spice bush, bladdernut, hazelnut, bloodroot, and grape.

Wildlife is abundant in this forest type including some rare species. Karst areas can be found in this forest type, which contain numerous sink holes, springs and streams that drain into subterranean caverns or caves. Many highly specialized and sensitive fish and wildlife species such as bats, amphibians, fish, and crustaceans spend all or part of their life in these unique and sensitive habitats. Federally listed species that occur in karst habitats of northeastern Oklahoma include the endangered Ozark big-eared bat, gray bat, and Indiana bat, and the threatened Ozark cavefish.

Table 3: Oak-hickory forest type.

Dominant Species	Primary Associates	Sites
White oak/red oak/hickory	Pin oak, northern pin oak, chinkapin oak, black oak, dwarf chinkapin oak, American elm, bur oak, white ash, sugar maple, red maple, walnut, basswood, locust, beech, sweetgum, blackgum, dogwood	wide variety of well drained upland soils
White oak	Black oak, northern red oak, bur oak, hickory, white ash	scattered patches on uplands, loamy soils but on drier sites than white oak/red oak/hickory group
Northern red oak	Black oak	spotty distribution on ridge crests and north slopes in mountains but also found on rolling land, slopes and benches on loamy soil
Sassafras/persimmon	Elm, eastern redcedar, hickory, ash, sugar maple, oaks	abandoned farmlands and old fields
Sweetgum	Red maple, white ash, green ash, other moist site hardwoods	generally occupies moist, lower slopes
Bur oak	Northern pin oak, black oak, chinkapin oak, eastern redcedar, shagbark hickory, black walnut, eastern cottonwood, white ash, American elm, swamp white oak, honey locust, American basswood	drier uplands to moist bottomlands with drier uplands more common in the northern part of the range and the moist bottomlands more common in the southern part of the range
Black walnut	white ash, black cherry, basswood, beech, sugar maple, oaks, hickory	coves and well drained bottoms
Black locust	Many species of hardwood and hard pines may occur with in mixture.	may occur on any well-drained soil but best on dry sites, often in old fields
Chestnut oak/black oak/scarlet oak	Northern red oak, southern red oak, post oak, white oak, shagbark hickory, pignut hickory, blackgum, sweetgum, red maple, shortleaf pine	dry upland sites on thin-soiled rocky outcrops in dry ridges and slopes
Mixed upland hardwoods	Ohio buckeye, Texas buckeye, red buckeye, American hornbeam, American chestnut, eastern redbud, flowering dogwood, hawthorn spp., cockspur hawthorn, downy hawthorn, downy hawthorn, fleshy hawthorn, dwarf hawthorn, honey locust, Kentucky coffeetree, osage-orange, all mulberries, blackgum, southern red oak, shingle oak, laurel oak, water oak, live oak, willow oak, black locust	wide variety of upland sites

Source: USDA Forest Service: Oklahoma Forest Inventory and Analysis Data

Oak-Pine Forest Types

In the hardwood/softwood forest types, the softwood component stocking needs to be 25-49%.

These forest types occur mostly in east central Oklahoma and are found sporadically throughout the shortleaf pine, loblolly pine, and oak-hickory forest types. The dominant stocking of this forest type is shortleaf pine, loblolly pine, and a variety of oak species such as post oak, northern and southern red oak, and white oak. This forest type is essentially a transition zone between the pine forest types and the upland oak forest types. Shortleaf pine/oak forest type area estimate increased from 433,026 in 2015 to 476,029 acres of forest land in 2018 (SE±49,459) while mixed loblolly/hardwood stands occupied an estimated 103,590 acres in 2018 (SE±23,711), a small decrease in the estimate from the 2015 of 109,094.

It frequently exhibits an uneven aged condition in which the pine is significantly older than the hardwood component and is of a relatively narrow age class. Only on drier sites and where the canopy is severely reduced are enough pine saplings found to indicate that the pine component is replacing itself. The frequency of occurrence of pine trees in the overstory is steadily decreasing because of its greater age and less regeneration in the understory.

This forest type is usually found on coarse textured, well drained, and often shallow and droughty soils. Some common understory vegetation includes flowering dogwood, persimmon, blueberries, greenbrier, Virginia creeper, honeysuckle, viburnums, trumpet vine, blackberries, and blackhaw.

Table 4: Oak-pine forest type.

Dominant Species	Primary Associates	Sites
Shortleaf pine/oak	Oaks (generally include white, blackjack, black, post, and southern red), hickory, blackgum, sweetgum	generally in dry, low ridges, flats, and south slopes
Loblolly pine/hardwood	Wide variety of moist and wet site hardwoods including blackgum, sweetgum, red maple, white and green ash, American elm. On drier sites, associates include southern and northern red oak, white oak, post oak, persimmon, hickory.	usually moist to very moist though not wet all year, but also on drier sites

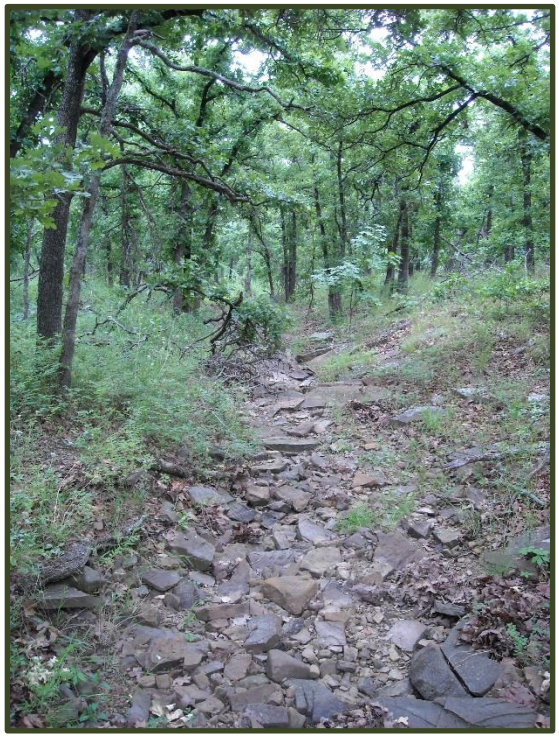
Source: USDA Forest Service: Oklahoma Forest Inventory and Analysis Data

Post Oak – Blackjack Oak Forest Type

In the hardwood forest types, the softwood component stocking needs to be less than 25%.

The post oak – blackjack oak forest type, commonly known as the Cross Timbers, is a complex mosaic of upland deciduous forest, savanna, and glade communities that spreads across most of central Oklahoma continuing into Kansas and Texas. The overstory is largely composed of post oak, blackjack oak, and black hickory with the percent of blackjack oak increasing in the composition as one moves west. The understory is made up of a mixture of native grasses including switch, Indian, little bluestem, big bluestem, and other species depending upon the site. The post oak/blackjack forest type was estimated to occupy 3,444,355 acres of forest in 2018 (SE±116,074). The 2018 estimate is less than the 2015 estimate of 3,529,403 acres.

The Cross Timbers earned its name from settlers who found much of the thick forests impassable as Oklahoma Territory was opened for settlement. American writer Washington Irving passed through in 1832 and wrote of the "vexations of flesh and spirit" that set upon the travelers who he said felt as if they were "struggling through forests of cast iron."



Cross Timbers serves as habitat for large populations of mammals and birds. Much of this can be attributed to the area's combination of ecological characteristics provided by heavily forested areas and prairies. One of the largest and most common is the white-tailed deer and includes small species like bobwhite quail and cottontail rabbit.

Since this forest type is essentially noncommercial for timber production, it has never experienced large scale industrial logging. Large tracts of old growth post oak and blackjack oak forests are found spread throughout central Oklahoma with trees as old as 200 to 400 years. The trees in this forest type average only 15 to 40 feet in height and 10 to 20 inches in diameter.

The Cross Timbers are often underappreciated because these small stature trees do not fit the stereotypical view of what a forest looks like. Some research has been conducted in the Cross Timbers, but overall failure to understand the ancient Cross Timbers is contributing to the ongoing destruction and fragmentation of this forest type which is a major threat to biodiversity, water quality, and recreational values

Table 5: Post oak - blackjack oak forest type.

Dominant Species	Primary Associates	Sites
Post Oak/Blackjack Oak (includes dwarf post oak)	Black oak, hickory, southern red oak, white oak, scarlet oak, shingle oak, live oak, shortleaf pine, blackgum, red maple, winged elm, hackberry, chinkapin oak, shumard oak, dogwood, eastern redcedar	dry uplands and ridges

Source: USDA Forest Service: Oklahoma Forest Inventory and Analysis Data

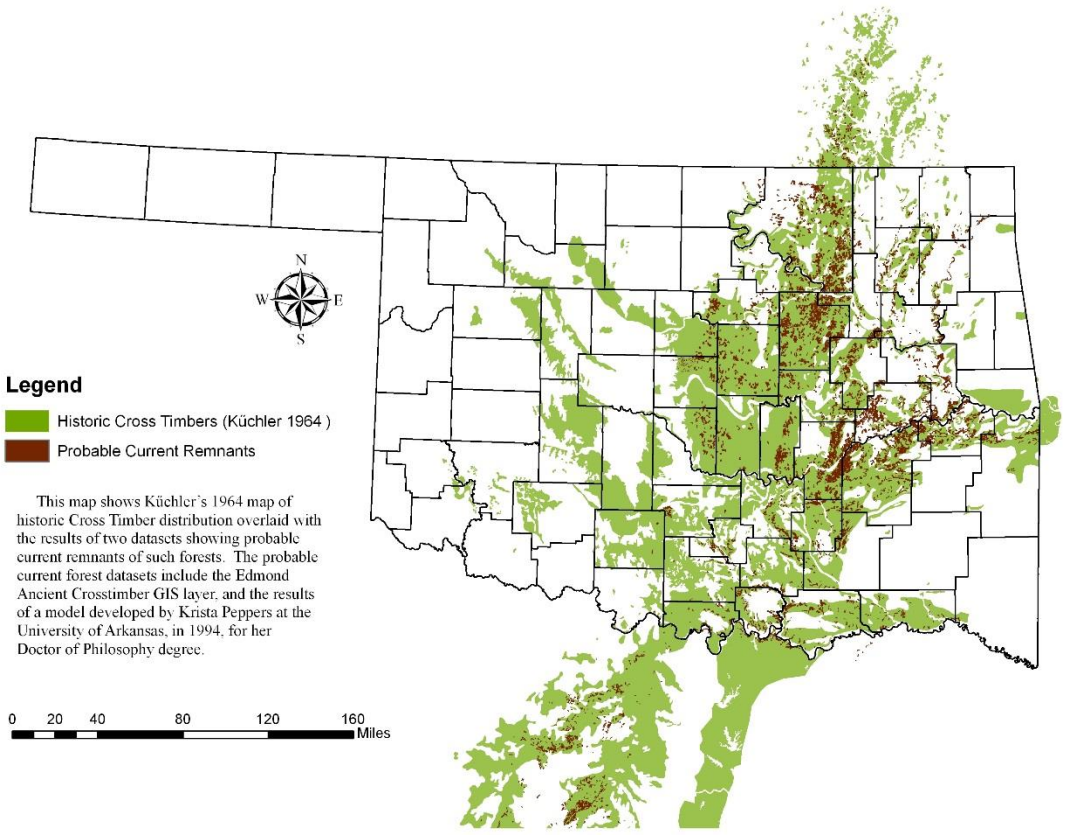


Figure 7: Map of cross timbers (post oak - blackjack oak forest type) and probable old growth tracts.

Bottomland Hardwood Forest Types

The Bottomland Hardwood forests occur on broad river and stream floodplains across the state. Oklahoma's bottomland hardwoods have been heavily cut over and cleared for agricultural uses. Because their wood is valuable and easy to transport along waterways, these trees were among the first forests cut in Oklahoma. Man-made lakes have flooded many uncut areas. The current area estimate of bottomland hardwood forests is 1,638,318 acres (SE±84,209). This estimate is approximately the same as the 2015 area estimate of 1,631,872 acres.

These forests vary widely in composition from east to west because of differences in rainfall and other factors. Both the amount of growth and the number of plant species increase from west to east along the principal east-west streams. More mesic conditions are present in extreme eastern Oklahoma due to the increase in rainfall, the low altitude of about 400 feet and the comparatively high humidity. Under these favorable conditions the vegetation shows an increased growth rate and increased number of herb, vine, and shrub and tree species.

The surface of this type varies from the flat bottomlands to the steep canyon-like valleys and differs from the other timbered types of the state in that most of the bottom soils are extremely fertile and deep, being alluvial in origin. In some areas saline deposits are present, particularly associated with the Cimarron, Salt Fork of the Arkansas and Salt Fork of Red River.

Bottomland forests offer some of the better game habitat condition in Oklahoma and are capable of supporting many different species. The more common game species are bobwhite quail, squirrel, cottontail rabbit, turkey and deer.

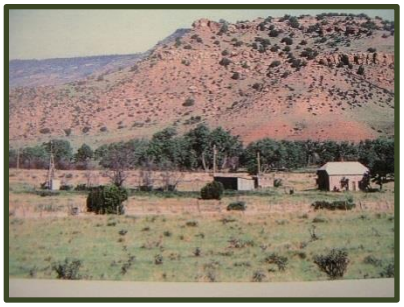
Table 6: Bottomland hardwood forest type.

Dominant Species	Primary Associates	Sites
OAK/GUM/CYPRESS Group		
Swamp chestnut oak/cherrybark oak	Shumard oak, delta post oak, white ash, hickory, white oak, blackgum, sweetgum, southern red oak, post oak, American elm, winged elm, beech	within alluvial flood plains of major rivers, on all ridges in the terraces, and on the best fine sandy loam soils on the highest first bottom ridges
Sweetgum/Nuttall oak/willow oak	American holly, green ash, American elm, pecan, cottonwood, red maple, honeylocust, persimmon	very wet
Overcup oak/water hickory (includes shellbark hickory)	Pin oak, willow oak, American elm, green ash, hackberry, persimmon, red maple	In south within alluvial flood plains in low, poorly drained flats with clay soils, also in sloughs and lowest backwater basins and low ridges with heavy soils that are subject to late spring inundation
Sweetbay/swamp tupelo/red maple	Blackgum, gum bumelia, waterlocust, all magnolias, red maple, water-elm, loblolly pine, American elm, other moist-site hardwoods	very moist but seldom wet all year--shallow ponds, muck swamps, along smaller creeks in Coastal Plain (rare in the Northeast)
ELM/ASH/COTTONWOOD Group		
River birch/sycamore	Red maple, black willow, and other moist-site hardwoods	moist soils at edges of creeks and rivers
Cottonwood	Willow, white ash, green ash, and sycamore	streambanks where bare, moist soil is available
Willow (includes peachleaf and black willow)	Cottonwood, green ash, sycamore, pecan, American elm, red maple, and boxelder	streambanks where bare, moist soil is available
Sycamore/pecan/American elm (includes slippery and rock elm)	Sweetgum, green ash, hackberry, silver maple, cottonwood, willow, boxelder, river birch	bottomlands, alluvial flood plains of major rivers
Sugarberry/hackberry/elm/ green ash (includes American, winged, cedar, slippery, and rock elm)	Boxelder, pecan, blackgum, persimmon, honeylocust, red maple, hackberry	low ridges and flats in flood plains
Silver maple/American elm	Sweetgum, pin oak, swamp white oak, eastern cottonwood, sycamore, green ash, other moist-site hardwoods	primarily on well-drained moist sites along river bottoms and floodplains, and beside lakes and larger streams
Cottonwood/Willow (includes peachleaf and black willow)	White ash, green ash, sycamore, American elm, red maple, boxelder	streambanks where bare, moist soil is available

Source: USDA Forest Service: Oklahoma Forest Inventory and Analysis Data

Pinyon Pine – Juniper Forest Types (parts are Woodlands with 5% cover)

The pinyon pine-juniper forest type covers approximately 83,379 acres of land in the extreme northwest corner of the Panhandle, according to 2018 FIA data (SE±22,012). This represents a slight difference from the 2015 estimate of 110,811 acres. These savannah-like forests contain several species of western junipers, the easternmost extension of pinyon pine and scattered remnant stands of ponderosa pine. This forest type more often occurs as woodland because trees are short and crowns rarely touch. The woodland is typified by pinyons, although one or several species of juniper often dominate the stand. This forest type is found throughout the southwestern United States.



The common associates with this forest type are pinyon pine, ponderosa pine, one-seed juniper, Rocky Mountain juniper, Mohr's oak, and Gambel's oak. These trees are found on rocky mesas and are very short reaching no more than 20 feet in height. The common understory found includes wheatgrass, blue grama, cholla cactus, and sage brush.

Table 7: Pinyon pine - juniper forest type.

Dominant Species	Primary Associates	Sites
Juniper woodland (Includes Pinchot juniper, redberry juniper, Ashe juniper, California juniper, alligator juniper, Utah juniper, oneseed juniper. Pinyon pine is NOT present)	Various woodland oaks, ponderosa pine	low elevation with low annual precipitation
Pinyon-juniper woodland (Includes all pinyons and all junipers except Rocky Mountain and western juniper. Must have pinyon present)	Various woodland oaks, ponderosa pine	low elevations with low annual precipitation

Source: USDA Forest Service: Oklahoma Forest Inventory and Analysis Data

Eastern Redcedar Forest Type

Eastern redcedar is the most widely distributed conifer of tree size in the eastern United States, occurring in every state east of the 100th meridian. Eastern redcedar grows on a wide variety of soils, ranging from dry rock outcroppings to wet, swampy land. It is most frequently associated with thin soils derived from limestone and dolomite where rock outcroppings are common.

The eastern redcedar forests develop with few, if any, associated tree species. Hardy prairie grasses and periodic wildfires once relegated cedars to the more remote limestone outcrops and protected canyons but now passive land management, over-grazing livestock and suppressing wildfires have transformed much of Oklahoma into ideal conditions for eastern redcedar. As a result the occurrence of this forest type has increased over the past thirty years. FIA data from 2015 estimated (at least 50% basal area of eastern redcedar). Current 2018 data reports 533,390 acres of eastern redcedar forest type (SE±50,512). Eastern recedar/hardwood forests occupied an estimated 416,391 acres in 2015. The 2018 estimate of eastern redcedar/hardwood forests decreased to 385,386 acres (SE±43,664).

Wildlife utilization of this forest type is limited. Seeds are eaten in large quantities by birds and small mammals and thus dispersed. Passage through the digestive tract of a bird or other animal probably hastens germination. Large mammals such as deer only utilize this forest habitat as limited cover and will only browse eastern redcedar during the harshest winters.

Redcedar has many commercial uses and many groups have been researching utilization opportunities. Eastern redcedar logs are valuable and utilized but many markets have been slow to establish. A number of sawmills have opened across the state to utilize the products these trees provide, which include: cedar oil, litter box chips, mulch, lumber, rustic furniture, fence posts and insect repellent.

Table 8: Eastern redcedar forest type.

Dominant Species	Primary Associates	Sites
Eastern Redcedar	Gray birch, red maple, shortleaf pine, oak	usually dry uplands and abandoned fields on limestone outcrops and other shallow soils but can grow well on good sites.
Eastern redcedar/hardwood	Oak, hickory, walnut, ash, locust, dogwood, blackgum, hackberry, winged elm, shortleaf pine	usually dry uplands and abandoned fields

Source: USDA Forest Service: Oklahoma Forest Inventory and Analysis Data

Community Forest Type (Urban)

The community forest type is made up of all the trees in our cities and towns found along streets, highways, in parks, in yards, on school campuses, etc. For example, all the trees within Oklahoma City's boundaries make up a community forest. The trees in communities, just like the trees in rural forested areas, provide wildlife habitat, clean air, clean water, aesthetics, and recreation. A community forest is a working ecosystem like other forest types; it just has more human influence. The trees in this forest type might not be harvested for timber but they do have value that is often overlooked.

Table 9: Community forest type.

Dominant Species	Primary Associates	Sites
Wide variety of native and non-native tree species (This forest type changes often because of human influence)	Wide variety of native and non-native tree species	Urban areas (cities, towns, communities)

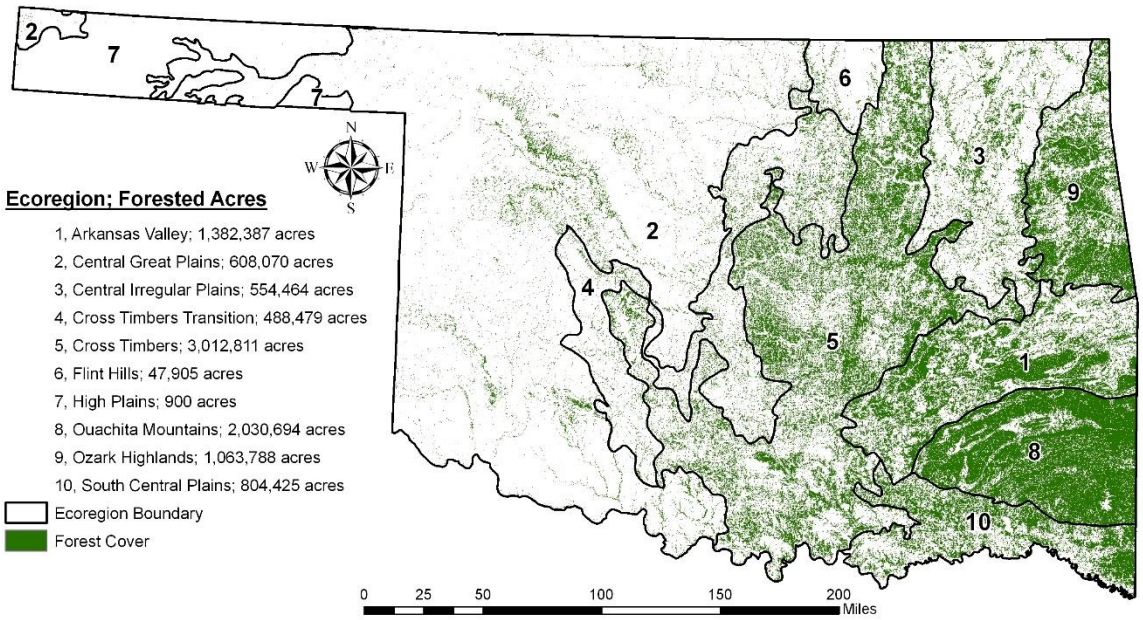
Distribution and Abundance of Forests

For many individuals unfamiliar with our state, Oklahoma is often perceived as a vast treeless prairie. This impression is far from the actual with approximately 26.9 percent of the state covered in forests. This amounts to approximately 11.8 million acres of rural and urban forestland (*Figure 11*). Oklahoma's forestland ownerships are separated into three major groups: private, federal, and state and local government. Oklahoma's forests are approximately 84% privately owned.

Oklahoma's forestlands can be divided into three classes.

Classes of Forestlands:

- Productive forestland – forestland capable of producing in excess of 20 cubic feet per acre per year and not legally withdrawn from timber production, with a minimum area classification of one acre. However, some of this class is not always classified as commercial forestland.
- Unproductive forestland – forestland incapable of producing 20 cubic feet per acre per year, with a minimum area classification of one acre.
- Woodlands – land where stocking cannot be determined, at least 10 percent crown cover by trees of any size or had at least ten percent cover in the past. Very few areas are classified as woodlands.



Oklahoma Forestlands dataset was extracted from the 2001 National Land Cover Dataset (NLCD) and includes classes 41, 42, 43, and 90 for the entire state; shrub/scrub class 52 was deleted from both the Central Great Plains and the High Plains ecoregions to alleviate confusion of forest with actual scrub.

Figure 8: Oklahoma forestland cover map.

According to the current data from the FIA, there are approximately 4.76 million acres of productive forestlands all located in Eastern Oklahoma (FIA Units 1 and 2) and 2.04 million acres of productive forestland in the rest of the state. The remaining 5.02 million acres of forestland, spread throughout the state, are currently classified as non-productive forests and woodlands. While the state's traditional forest industry is based primarily in the eastern counties, sawmills and industries which use wood as a primary input are located across the state.

To illustrate and describe the distribution and abundance of the forest resources in Oklahoma, the state was divided into three major forest regions, the Eastern, Central, and Western regions (*Figure 12*).

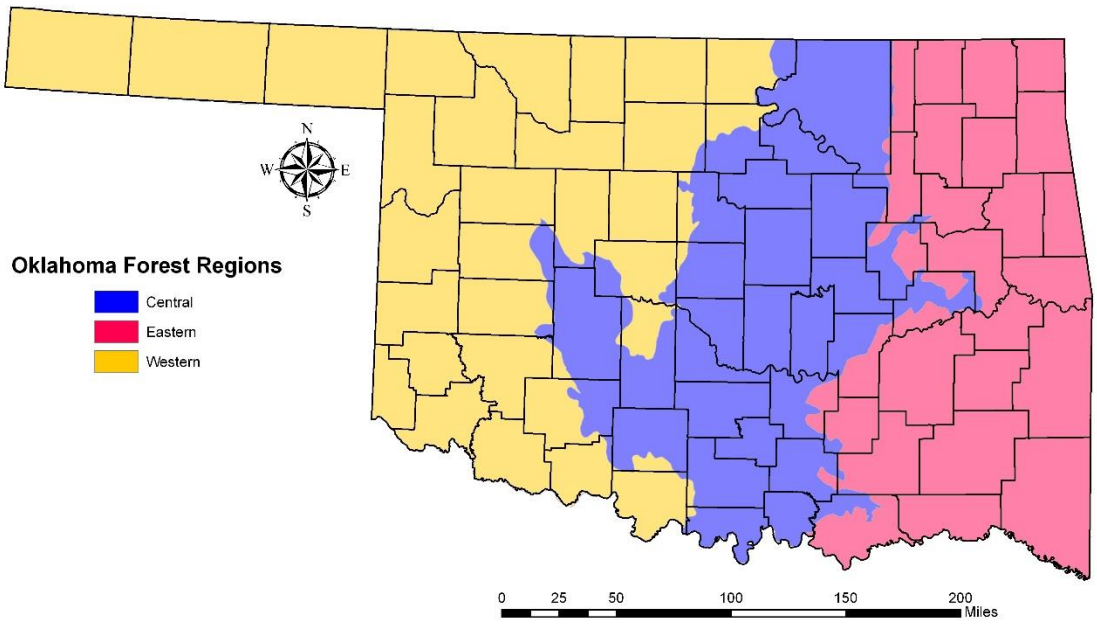
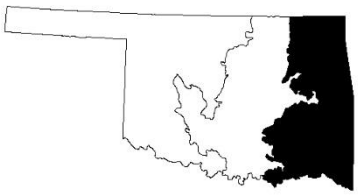


Figure 9: Forest regions of Oklahoma.

Eastern Forest Region of Oklahoma

Approximately 58% of the state's forests are found in the eastern region. The eastern forest region of Oklahoma is the most diverse region of the state. This region consists of five different ecoregions with eight forest types spread throughout. The eastern region is where the most productive forestland exists and where most of the tree planting for forestry purposes occurs. These forests contain the largest tracts of oak, hickory, and pine trees which support the largest portion of the state's timber industry. There are many small mills spread across the state, but the large manufacturing facilities are located within this region. The Ouachita and Ozark mountains are found in this region as well as the only national forest in Oklahoma, Ouachita National Forest, which is located in the southeast portion. Community forests are also found throughout this region.



***Total Land Acres*:** 12,979,002
***Forested Acres*:** 5,836,208

***Counties*:** Adair, Atoka, Bryan, Cherokee, Choctaw, Coal, Craig, Creek, Delaware, Haskell, Hughes, Johnston, Latimer, Le Flore, Marshall, Mayes, McCurtain, McIntosh, Muskogee, Nowata, Okmulgee, Osage, Ottawa, Pittsburg, Pontotoc, Pushmataha, Rogers, Sequoyah, Tulsa, Wagoner, Washington

Major Urban Areas (Population over 20,000):
Tulsa, Broken Arrow, Muskogee, Bartlesville, Owasso, and Jenks

Table 10: Eastern region total forested acres and included forest types.

Eastern Forest Region of Oklahoma											
Ecoregions within Eastern Region	**Forest Types within Ecoregions**									**Acres**	
	Shortleaf Pine	Loblolly Pine	Oak-Hickory	Oak-Pine	Post Oak - Blackjack Oak	Bottomland Hardwoods	Pinyon Pine - Juniper	Eastern Redcedar	Community (Urban)	**Total Acres**	**Total Forested Acres**
Arkansas Valley	x	x	x	x	x	x		x	x	3,077,680	1,382,837
Central Irregular Plains	x		x	x	x	x		x	x	3,332,383	554,464
Ouachita Mountains	x	x	x	x	x	x		x	x	2,589,790	2,030,694
Ozark Highlands			x		x	x		x	x	2,043,011	1,063,788
South Central Plains	x	x	x	x	x	x		x	x	1,936,138	804,425
Entire Eastern Region	x	x	x	x	x	x		x	x	**12,979,002**	**5,836,208**

Source: Forest type locations determined by 2009 OFS Analysis and the 2005 OK GAP Analysis

Eastern Region Wood Product Output and Use (18 eastern counties, FIA units)

The map shows the general locations of the primary forest product producers throughout the eastern region.

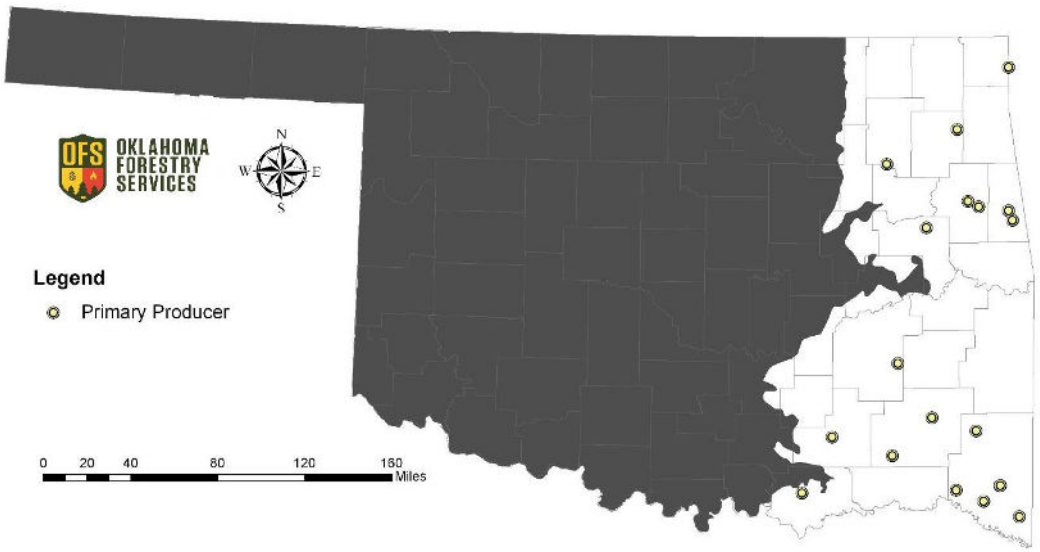


Figure 10: Map of primary wood product producer facilities in eastern Oklahoma, 2010.

Eastern Region Community Forests

The western edge of US eastern forest cover crosses into the eastern third of Oklahoma and is abundant with a variety of hardwoods and softwoods that include a mixture of oaks, hickories, pines and elms. The forests cover the rolling hills from the hilltops to the valleys. During settlement, communities in this part of the state often had to clear trees for home sites and farms. Trees continue to play important functions in eastern communities including the improvement of the environment, aesthetics, and the quality of living.

In Oklahoma, some communities are utilizing forestry and environmental tools and programs to manage their community forests. Out of the 189 communities (municipalities) in the eastern region, 8 are currently recognized as a Tree City USA. A major impact to a community's forest is the maintenance of infrastructure such as roads and powerlines and proper planning and use of forest management are important to maintaining community trees and forests. Five utility companies that serve the majority of Oklahoma residents are recognized as a Tree Line USA utility company.

As of September 2020, 63 communities across the state have a completed Community Wildfire Protection Plan (CWPP). Various communities are working on renewing their CWPP. In September 2020, there were 33 Firewise communities in Oklahoma.

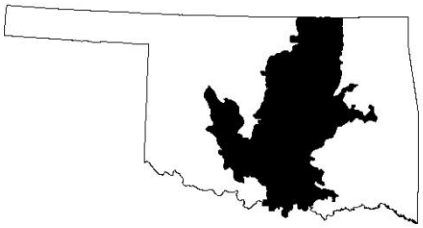
Many communities in the eastern region have CWPPs. Still, there are many more communities within the eastern forest region that should address wildfire hazards by developing a plan to be more prepared for wildfire events. More information about the CWPP program can be found in Appendix B.

Central Forest Region of Oklahoma

The central forest region is not as diverse as the eastern region but does have some extremely unique features. This region is made up of 3 ecoregions and 7 different forest types. Approximately 35% of the state's forests are within the central forest region.

The predominant forest type found in the central forest region is the post oak – blackjack oak forest type, commonly known as the Cross Timbers Forest. This forest type is a complex mosaic of upland deciduous forest, savanna, and glade communities that highlight the broad ecotone between the eastern forests and the western grasslands. Because the Cross Timbers forest type is essentially noncommercial for timber production, it has never experienced large-scale industrial logging. The Cross Timbers growing on level terrain have been widely cleared for agriculture, but undisturbed tracts of ancient Cross Timbers are still frequently present on steep, rocky terrain where timber removal for farming or grazing was not economically justified. Studies have demonstrated that ancient forests dominated by 200- to 400- year old post oak trees survive in literally hundreds of Cross Timbers tracts. It is estimated that approximately 1,088,000 acres of ancient post oak forests may survive in Oklahoma alone. There are also other forest types that spread across this region such as the bottomland hardwood forests, eastern redcedar forests, oak-pine forests, oak-hickory forests, and small amounts of shortleaf pine forests.

This region is the most populated region of the state and where the larger community forests exist. The Arbuckle Mountains fall within this region.



Total Land Acres: 12,881,411
Forested Acres: 3,549,195

Counties: Atoka, Bryan, Blaine, Caddo, Canadian, Carter, Cleveland, Coal, Comanche, Cotton, Creek, Custer, Dewey, Garfield, Garvin, Grady, Haskell, Hughes, Jefferson, Johnston, Kay, Kiowa, Lincoln, Logan, Love, Marshall, McClain, McIntosh, Murray, Muskogee, Noble, Okfuskee, Oklahoma, Okmulgee, Osage, Pawnee, Payne, Pittsburg, Pontotoc, Pottawatomie, Seminole, Stephens, Tulsa, Wagoner, Washington, Washita

Major Urban Areas (Population over 20,000): Oklahoma City, Norman, Edmond, Midwest City, Moore, Stillwater, Shawnee, Ardmore, Duncan, Del City, Bethany

Table 11: Central region total forested acres and included forest types.

Central Forest Region of Oklahoma											
Ecoregions within the Central Region	Forest Types within Ecoregions									Acres	
	Shortleaf Pine	Loblolly Pine	Oak-Hickory	Oak-Pine	Post Oak - Blackjack Oak	Bottomland Hardwoods	Pinyon Pine - Juniper	Eastern Redcedar	Community Forests	Total Acres	Total Forested Acres
Cross Timbers	x		x	x	x	x		x	x	8,487,831	3,012,811
Cross Timbers Transition					x	x		x	x	3,776,350	488,479
Flint Hills					x	x		x	x	617,230	47,905
Entire Central Region	x		x	x	x	x		x	x	**12,881,411**	**3,549,195**

Source: Forest type locations determined by 2009 OFS Analysis and the 2005 OK GAP Analysis

Central Region Wood Product Output and Use

The central region of Oklahoma currently has no available data for timber product output and use, but Figure 11 shows where the known primary wood using mills are located. The U.S. Forest Service – Forest Inventory and Analysis Program is currently surveying this area and more data will be available at a later date.

There are many management challenges in this region compared to the eastern region because very few markets exist and the forest types are underappreciated.

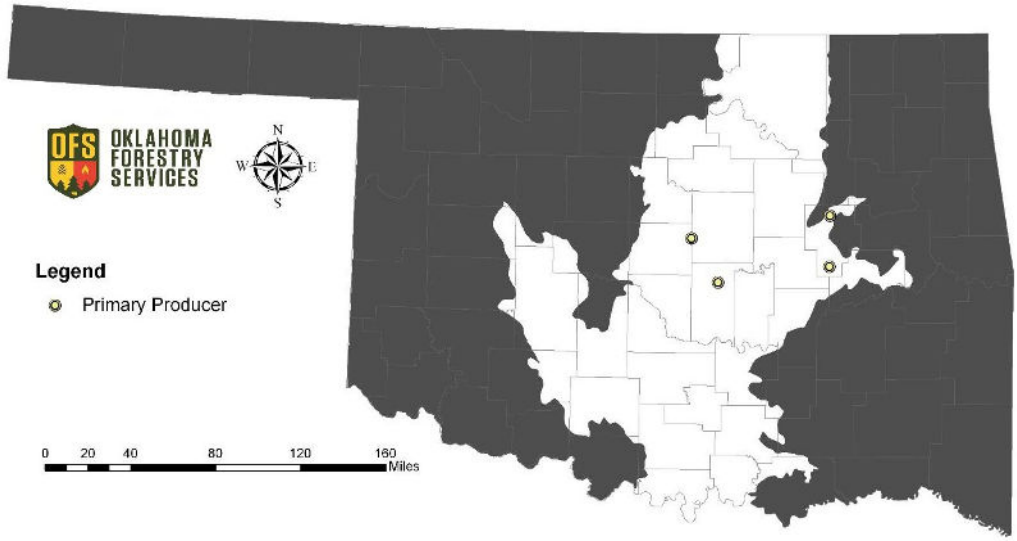


Figure 11: Map of primary wood product producer facilities in central Oklahoma, 2010.

Central Community Forest

Predominant forest cover in the central region communities consists of post and blackjack oak. Natural forests occur along the sides of the rolling hills into the valleys and canyons and along the natural waterways. Trees were planted during settlement for shade and a food source with that turning to aesthetics and other environmental benefits as these communities grew. Out of the 227 communities (municipalities) in the central region, 10 are currently recognized as a Tree City USA.

Many communities in the central region have Community Wildfire Protection Plans (CWPP). Still, there are many more communities within the central forest region that should address wildfire hazards by developing a plan to be more prepared for wildfire events. More information about the CWPP program can be found in Appendix B.

Wildlife Species of Greatest Conservation Need that Inhabit the Central Region
As mentioned in the eastern forest region section, forests provide many wildlife species with major habitat requirements – food, cover, water and space. A wide variety of wildlife species depend on at least one of the 7 forest types found throughout this region therefore forest management is a key component in providing biodiversity throughout central Oklahoma.

The Oklahoma Comprehensive Wildlife Conservation Strategy organized the priority wildlife species of greatest conservation need by forested habitats within the central region. Below the forested habitats are listed including the priority wildlife species and the conservation issues associated with each habitat as defined by the Oklahoma Department of Wildlife Conservation. There are only four out of the seven forest types described in this section because of some differences between the Oklahoma Wildlife Conservation Strategy and this Forest Action Plan.

Western Forest Region of Oklahoma

The western forest region is predominantly grasslands containing less than 7% of the state's forests. There are 2 ecoregions with 5 different forest types sparsely spread throughout the region. Post oak – blackjack oak forests are found along the eastern edge of this region while community forest can be found in most of the urban areas. Eastern redcedar forests are native to canyons and ridges but have encroached onto unmanaged grasslands and some riparian forests. The majority of the forests in this region are bottomland hardwoods found along the rivers and tributaries, but many have been degraded or lost to cropland or rangeland. A unique forest found only in Cimarron County is the Pinyon Pine – Juniper forest type. This forest type consists of small stature pinyon pine, one-seed juniper, and ponderosa pine. The Black Mesa Nature Preserve, located in the northwestern corner of Cimarron County, features the highest elevation, 4,973 feet, in the state.

Total Land Acres: 18,884,029
Forested Acres: 608,970

Counties: Alfalfa, Beaver, Beckham, Blaine, Caddo, Canadian, Carter, Cimarron, Cleveland, Comanche, Cotton, Custer, Dewey, Ellis, Garfield, Grady, Grant, Greer, Harmon, Harper, Jackson, Jefferson, Kay, Kingfisher, Kiowa, Logan, Love, Major, McClain, Noble, Oklahoma, Osage, Pawnee, Roger Mills, Stephens, Texas, Tillman, Washita, Woods, Woodward

Major Urban Areas (Population over 20,000): Lawton, Enid, Ponca City, Altus, Yukon

Table 12: Western region total forested acres and included forest types.

Western Forest Region of Oklahoma											
Ecoregions within the Western Region	**Forest Types within Ecoregions**									**Acres**	
	Shortleaf Pine	Loblolly Pine	Oak-Hickory	Oak-Pine	Post Oak - Blackjack Oak	Bottomland Hardwoods	Pinyon Pine - Juniper	Eastern Redcedar	Community (Urban)	**Total Acres**	**Total Forested Acres**
Central Great Plains					x	x	x	x	x	16,632,500	608,070
High Plains						x			x	2,251,529	900
Entire Western Region					x	x	x	x	x	**18,884,029**	**608,970**

Source: Forest type locations determined by 2009 OFS Analysis and the 2005 OK GAP Analysis

Western Region Wood Product Output and Use

The western region of Oklahoma currently has no available data for timber product output. Figure 12 shows where the known primary wood using mills are located. The U.S. Forest Service – Forest Inventory and Analysis Program is currently surveying this area and data will be available at a later date.

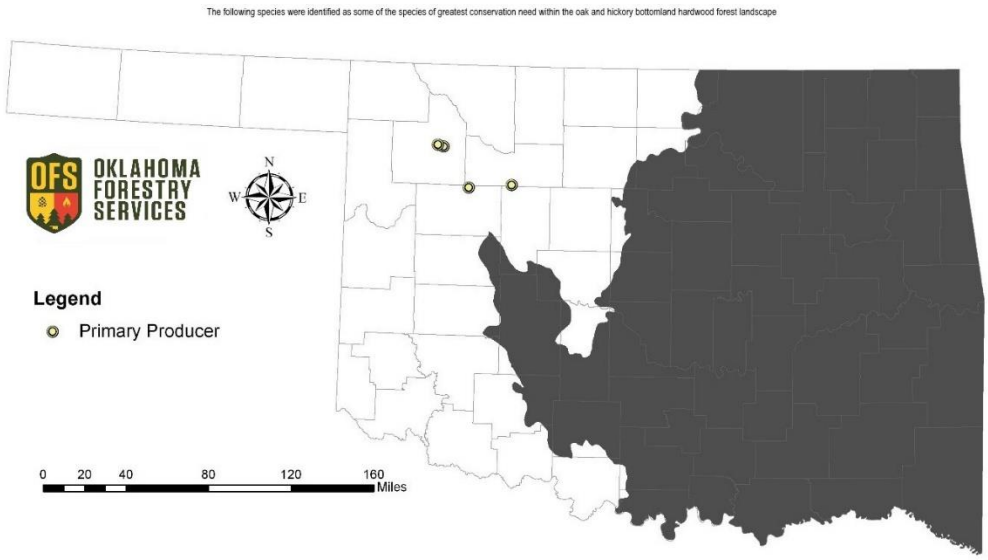


Figure 12: Map of primary wood product producer facilities in western Oklahoma, 2010.

Western Community Forests

The community forests of western Oklahoma are among the arid grasslands and are more open in their environment. Native trees mainly exist along canyon walls, valleys, and along riparian corridors. Trees in communities were generally planted during settlement periods to provide for shade during hot summer months and provide a food source on the prairie. Communities continue planting trees today to support the environment, beautification and quality of living needs. Out of the 183 communities (municipalities) in the western region, 5 are currently recognized as a Tree City USA.

Many communities in the western region have Community Wildfire Protection Plans (CWPP). Still, there are many more communities within the western forest region that should address wildfire hazards by developing a plan to be more prepared for wildfire events. More information about the CWPP program can be found in Appendix B.

Wildlife Conservation

To identify wildlife conservation concerns we reviewed the *2016 Oklahoma Comprehensive Wildlife Conservation Strategy,* published by the Oklahoma Department of Wildlife Conservation. We used this report to inform our identification of forest priority lands and identify landscapes or species of high conservation need within forested regions. Issue descriptions are sourced primarily from this document.

Forests provide many wildlife species with major habitat requirements – food, cover, water and space. When forests are disturbed, such as by timber harvest, natural disaster, wildfires or other event, the quantity, quality, and distribution of these habitat features will change. As a result, certain wildlife will be favored in forests at different stages of succession. Wildlife may be associated with forests at a particular successional stage because of types and amounts of habitat that are provided. Most wildlife species need a variety of forest successional stages to thrive therefore managing forests to provide different stages of growth helps provide more diversity.

Cross Timbers Region (IV & V)

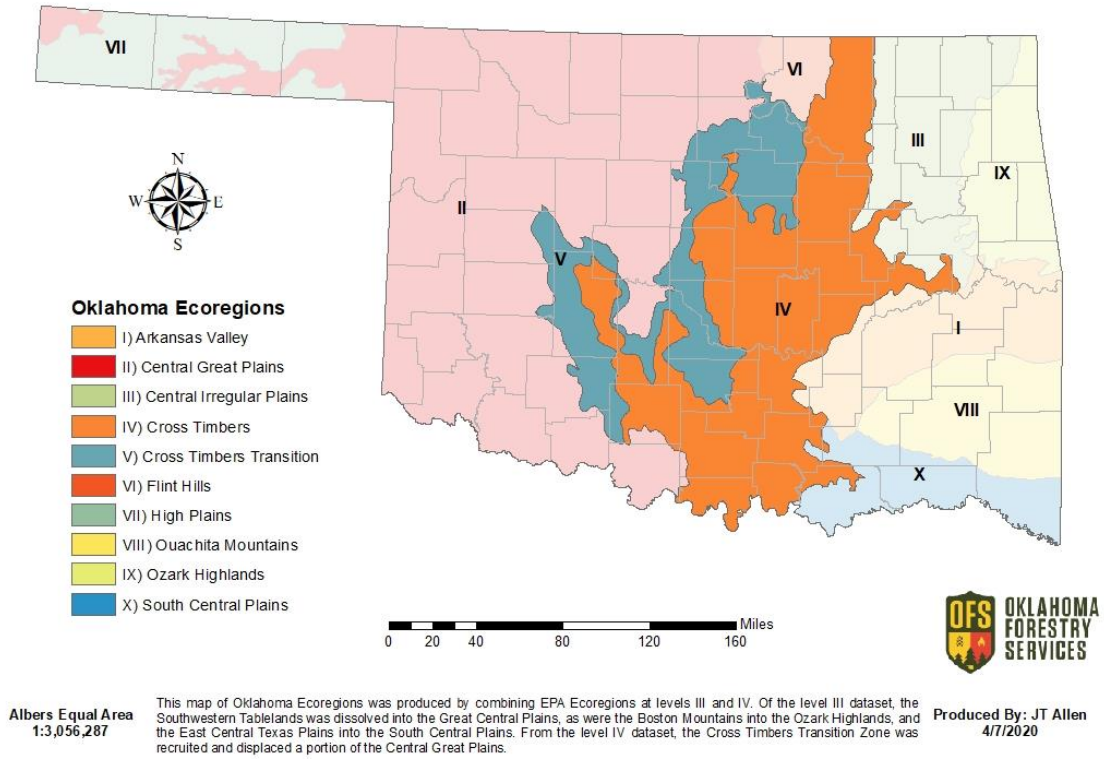


Figure 13: Cross Timbers wildlife conservation region.

In the Cross Timbers region several priority conservation landscapes were identified. Of these, OFS focused on those of very high and high priority, as well as being likely to be influenced by forest management. Small river and oak and hickory bottomland hardwood forest were identified as very high priority landscapes.

Small River

The primary issue that might be improved with increased forest management in the small river landscape is the improvement of riparian zones. Riparian zones help maintain water quality by helping to filter sediment and providing shade to regulate water temperature. Degraded riparian conditions means a degraded or loss of habitat. Loss of forest overstory, common with a change

in land use, reduces shading of surface water which can create undesirable environments for aquatic species. On the other hand, overly dense forests can shade out the understory reducing the growth of grasses and herbaceous species. It is these understory species that provide the bulk of the filtering. Without a healthy understory, increased sediment and organic material enter the water body contributing to a variety of problems including increased turbidity, pH alteration, nutrient toxicity and reduced dissolved oxygen.

The following species were identified as the species of greatest conservation need within the Cross Timbers small river landscape:

Table 13: Cross timbers small river landscape species of concern.

Bird	Fish	Invertebrate	Reptile
Bald Eagle	Alligator Gar	Little Dubiraphian Riffle Beetle	False Map Turtle
Canvasback	Blackspot Shiner	Little Spectaclecase	Ouchita Map Turtle
Little Blue Heron	Least Darter	Monkeyface Mussel	Razor-backed Musk Turtle
Northern Pintail	Blue Sucker	Painted Crayfish	River Cooter
Prothonotary Warbler	Bluntface Shiner	Ouachita Kidneyshell	Smooth Softshell

Oak and Hickory Bottomland Hardwood Forest

The primary issue identified for this landscape is the loss of this forest type. A combination of land-use change and flooding have been the primary cause of the loss of this conservation landscape. A common scenario is the clearing of forest to convert to agricultural land. Construction of reservoirs has also led to a loss of this forest type to constant inundation. These practices lead to the loss of habitat many species require.

The following species were identified as the species of greatest conservation need within the oak and hickory bottomland hardwood forest landscape:

Table 14: Oak/hickory bottomland hardwood forest landscape species of concern.

Bird	Reptile	Mammal	Amphibian
American Woodcock	Chicken Turtle	Eastern Spotted Skunk	Crawfish Frog
Hooded Warbler	Scarletsnake	Texas Rice Rat	Hurter's Spadefoot
Kentucky Warbler	Razor-backed Musk Turtle	Swamp Rabbit	
Little Blue Heron	River Cooter		
Louisiana Waterthrush	Smooth Softshell		

Ozark Region (IX)

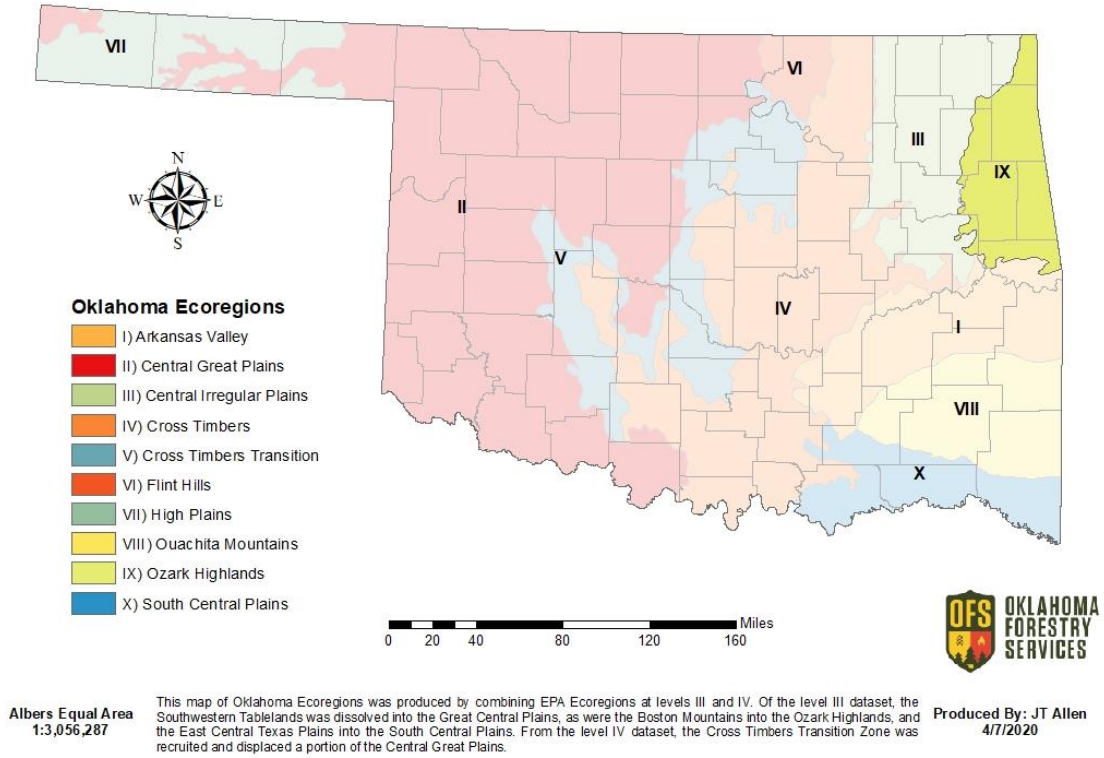


Figure 14: Ozark wildlife conservation region.

In the Ozark region several priority conservation landscapes were identified. Of these, OFS focused on those of very high and high priority, as well as being likely to be influenced by forest management. Small rivers, white oak/hickory mesic forest, and gravel-bottom streams and associated riparian forests were identified as high priority, while shortleaf pine-oak-hickory woodlands and oak/hickory bottomland hardwood forest were identified as high priority.

Small Rivers and Gravel-bottom Streams and Associated Riparian Forests

Riparian zones might be improved with increased forest management in these landscapes. Riparian zones help maintain water quality by helping to filter sediment and providing shade to regulate water temperature. Degraded riparian conditions means a degraded or loss of habitat. Loss of forest overstory, common with a change in land use, reduces shading of surface water which can create undesirable environments for aquatic species. On the other hand, overly dense forests can shade out the understory reducing the growth of grasses and herbaceous species. It is these understory species that provide the bulk of the filtering. Without a healthy understory, increased sediment and organic material enter the water body contributing to a variety of problems including increased turbidity, pH alteration, nutrient toxicity and reduced dissolved oxygen.

The following species were identified as the species of greatest conservation need within the Ozark small river and gravel-bottom stream riparian forest landscapes:

Table 15: Small rivers and gravel-bottom streams riparian forest species of concern.

Bird	Fish	Invertebrate	Reptile
Little Blue Heron	Bluntface Shiner	Meek's Crayfish	False Map Turtle
Louisian Waterthrush	Least Darter	Midget Crayfish	Ouachita Map Turtle
Prothonotary Warbler	Redspot Chub	Osage Snowfly	River Cooter
	River Darter	Ouachita Kidneyshell	
	Shorthead Redhorse		

White Oak/Hickory Mesic Forest

The primary issue facing this conservation landscape related to forestry is fragmentation, loss of habitat and lack of management. This fragmentation comes primarily from the development of infrastructure such as pipelines, roads, utility lines, conversion to agriculture and residential development. Fragmentation creates smaller tracts of forest reducing the space available for certain species and making it more difficult to move between habitats. Fragmentation sometimes leads to smaller ownerships, which can make it more difficult to entice loggers to work a tract. Conversion of this forest type into agricultural land or residential development results in habitat loss of often already isolated tracts. Lack of management in areas where this forest has been cutover in the past has led to more even aged timber conditions, which lacks the diversity typically found in this forest type. Uneven aged stands typically have a more developed mid-story and understory.

The following species were identified as the species of greatest conservation need within the Ozark white oak/hickory mesic forest landscape:

Table 16: White oak/hickory mesic forest species of concern.

Amphibian	Bird	Invertebrate	Mammal
Oklahoma Salamander	American Woodcock	American Burying Beetle	Eastern Spotted Skunk
Ozark Zigzag Salamander	Cerulean Warbler	Diana Fritillary	Gray Bat
Ringed Salamander	Hooded Warbler	Oklahoma Liptooth Snail	Indiana Bat
	Kentucky Warbler	Ozark Mantleslug	Northern Long-eared Bat
	Wood Thrush	Smooth-lip Shagreen	Ozark Big-eared Bat

Shortleaf Pine-Oak-Hickory Woodlands

The primary issue facing this conservation landscape is the transition it has experienced from an often open woodland to a closed-canopy forest. This transition is largely the result of the loss of the historic fire regime in the area. Additionally, wide-spread harvesting has created more even-aged forests. This results in a less diverse forest in both vegetative composition and forest structure. Support for prescribed fire and managing to increase the number of age cohorts will have a restorative effect on this landscape.

The following species were identified as some of the species of greatest conservation need within the oak and hickory bottomland hardwood forest landscape:

Table 17: Shortleaf Pine/Oak/Hickory Woodlands species of concern.

Amphibian	Bird	Mammal	Reptile
Ringed Salamander	American Woodcock	Long-tailed Weasel	Western Diamond-backed Rattlesnake
	Bachman's Sparrow	Northern Long-eared Bat	
	Blue-winged Warbler		
	Norhern Bobwhite		
	Red-headed Woodpecker		

Oak/Hickory Bottomland Hardwood Forest

The primary issue facing this conservation landscape is habitat loss. Conversion to agricultural production has reduced the number of acres of this forest type, thereby reducing the available habitat. Fragmentation from infrastructure development is further reducing the amount of unbroken habitat. Additionally, the development of reservoirs and stream channelization has altered the flood regime in the area, which bottomland hardwoods rely on. Forest management focused on preserving the integrity and connection of bottomland hardwood forests to their associated streams and rivers will help mitigate the loss of this landscape.

The following species were identified as some of the species of greatest conservation need within the oak and hickory bottomland hardwood forest landscape:

Table 18: Oak/Hickory Bottomland Hardwood Forest species of concern.

Amphibian	Bird	Mammal	Invertebrate
Crawfish Frog	American Woodcock	Gray Bat	Diana Fritillary
Oklahoma Salamander	Cerulean Warbler	Northern Long-eared Bat	
Ozark Zigzag Salamander	Hooded Warbler	Swamp Rabbit	
Ringed Salamander	Prothonatory Warbler		
	Rusty Blackbird		

Arkansas Valley, Ouachita Mountains, and South Central Plains Regions

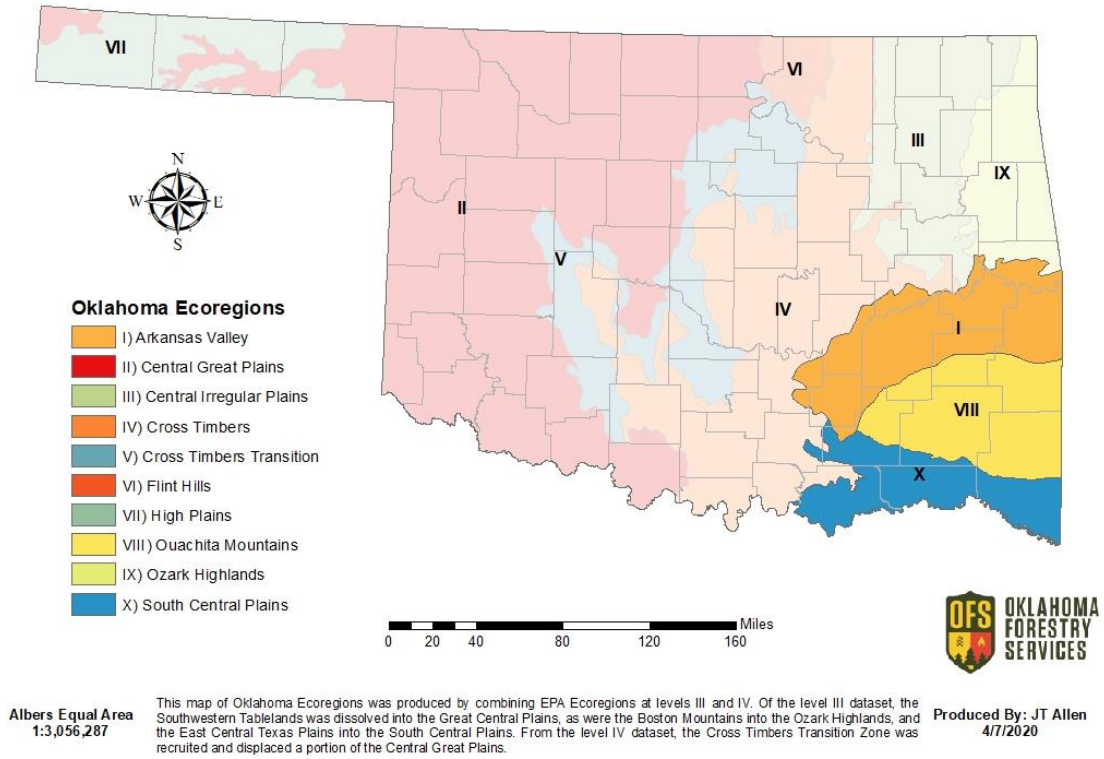


Figure 15: Arkansas Valley, Ouachita Mountains, and South Central Plains wildlife conservation region.

Small Rivers

The primary issue facing this conservation landscape is the loss of riparian vegetation. This often happens due to land use change or neglecting to establish streamside management zones during timber harvesting. Proper forest management and associated best management practices will help maintain riparian zones by reducing the potential for erosion. Best management practices identify appropriate streamside management zone buffer widths depending on the class of stream.

The following species were identified as some of the species of greatest conservation need within the oak and hickory bottomland hardwood forest landscape:

Table 19: Small rivers species of concern.

Bird	Fish	Mammal	Reptile
Bald Eagle	Black Buffalo	Northern Long-eared Bat	Alligator Snapping Turtle
Canvasback	Blackside Darter	Southeastern Bat	American Alligator
Little Blue Heron	Bluehead Shiner		Ouachita Map Turtle
Northern Pintail	Leopard Darter		River Cooter
Wood Stork	Longnose Darter		Spiny Softshell Turtle

White Oak/Hickory Mesic Forest
The primary issue facing this conservation landscape is land use change, primarily to commercial pine production. The tree species in this forest type are considered to be late successional habitat and timber harvesting tends to favor early successional species. Wide-spread harvesting in the past resulted in the loss of these late successional species and the establishment of early successional species. Forest management focused on reducing the frequency and intensity of disturbance will promote the recovery of this forest type. Low intensity prescribed fire will mitigate the potential for stand-replacing wildfires. Additionally, the use of harvesting and regeneration methods that maintain a significant presence of the overstory, such as a shelterwood harvest, will help maintain this forest type while still being productive.

The following species were identified as some of the species of greatest conservation need within the oak and hickory bottomland hardwood forest landscape:

Table 20: White Oak/Hickory Mesic Forest species of concern.

Amphibian	Bird	Mammal	Reptile
Four-toed Salamander	American Woodcock	Eastern Spotted Skunk	Louisiana Milksnake
Kiamichi Slimy Salamander	Cerulean Warbler	Golden Mouse	Scarletsnake
Many-ribbed Salamander	Hooded Warbler	Indiana Bat	
Rich Mountain Salamander	Kentucky Warbler	Northern Long-eared Bat	
Ringed Salamander	Wood Thrush	Southeastern Bat	

Oak/Hickory Bottomland Hardwood Forest

The primary issue facing this conservation landscape is habitat loss. Conversion to agricultural production has reduced the number of acres of this forest type, thereby reducing the available habitat. Fragmentation from infrastructure development is further reducing the amount of unbroken habitat. Additionally, the development of reservoirs and stream channelization has altered the flood regime in the area, which bottomland hardwoods rely on. Forest management focused on preserving the integrity and connection of bottomland hardwood forests to their associated streams and rivers will help mitigate the loss of this landscape.

The following species were identified as some of the species of greatest conservation need within the oak and hickory bottomland hardwood forest landscape:

Table 21: Oak/Hickory Bottomland Hardwood Forest species of concern.

Amphibian	Bird	Mammal	Reptile
Crawfish Frog	American Woodcock	Golden Mouse	American Alligator
Lesser Siren	Cerulean Warbler	Northern Long-eared Bat	Chicken Turtle
Many-ribbed Salamander	Little Blue Heron	Southeastern Bat	Mudsnake
Mole Salamander	Northern Pintail	Swamp Rabbit	Ouachita Map Turtle
Ringed Salamander	Red-headed Woodpecker	Texas Rice Rat	River Cooter

Shortleaf Pine/Oak Open Woodland
The primary issue facing this conservation landscape is the increasing density of woody species. This landscape was maintained by fire and a long history of fire suppression has removed fire from this landscape in most places. This results in the growth of more mesic species and the closing of the canopy. Managing with prescribed fire will promote the restoration of this landscape by keeping understory woody species in check and promoting the fire tolerant species that had

adapted to the historic conditions. Timber management should focus on retention of fire adapted trees such as shortleaf pine and post oak, and the removal of later successional tree species such as hickories and maples.

The following species were identified as some of the species of greatest conservation need within the oak and hickory bottomland hardwood forest landscape:

Table 22: Shortleaf Pine/Oak Open Woodland species of concern.

Bird	Invertebrate	Reptile
Bachman's Sparrow	American Burying Beetle	Western Diamond-backed Rattlesnake
Northern Bobwhite		
Prairie Warbler		
Red-cockaded Woodpecker		
Whip-poor-will		

Mesic Loblolly Pine/Oak Forest

The primary issue facing this conservation landscape is the loss of habitat to land use conversion and fragmentation. Much of this landscape has been converted to loblolly pine plantation or pasture, which does not provide the same habitat. Growing urban development, primarily cabins, is increasingly fragmenting this landscape resulting in smaller tracts of unbroken loblolly pine/oak forest. Forest management focused on regeneration methods other than clear cutting and replanting will help restore this landscape in places. Methods such as seed-tree and shelterwood cuts or group selection harvesting could be utilized. Getting forest management technical assistance to the growing wildland urban interface residences would also assist with this restoration.

The following species were identified as some of the species of greatest conservation need within the oak and hickory bottomland hardwood forest landscape:

Table 23: Mesic Loblolly Pine/Oak Forest species of concern.

Amphibian	Bird	Mammal	Reptile
Mole Salamander	American Woodcock	Golden Mouse	Louisiana Milksnake
Sequoyah Slimy Salamander	Brown-headed Nuthatch	Rafinesque's Big-eared Bat	Scarletsnake
	Hooded Warbler	Seminole Bat	
	Kentucky Warbler	Southeastern Bat	
	Prairie Warbler		

Forest Ownership

Oklahoma's population in 2010 was 3,751,351, and the latest estimates for 2013 show an increase of 2.6% to 3,850,568. The increase in population is increasing pressure on Oklahoma's forests and natural resources. In 2010, it was estimated that 2,485,029 people lived in urban areas with 1,266,322 people living in rural areas. Both numbers have increased since 1980. There are approximately 44 million acres of land in Oklahoma, and the majority of the land is privately owned. A large percentage of the 11.8 million acres of forestland, in both rural and urban areas, is under pressure of conversion to non-forest uses.

Oklahoma's forestlands are characterized by private ownership. In fact, almost 90 percent of the forested acreage in Oklahoma is in the hands of the private sector. Large privately owned forest tracts continue to be fragmented and the number of ownerships continues to increase. More landowners with smaller tracts of forestland complicate the management of forests statewide.

Private Forestland Ownership

There are approximately 40 million acres of private land and roughly 8.5 million acres are forested. The tribal lands are included in the acreage of privately owned lands. The USDA Forest Service's National Woodland Owner Survey is conducted to improve the understanding of who owns the forests of the United States, why they own them, how they use them, and what they intend to do with them. Two hundred and fifty four private landowners from Oklahoma participated in the survey between 2011 and 2013. Below are a few of the results from the survey:

The landowners' top five reasons for owning the forestland are:

1. Wildlife
2. Legacy
3. Beauty/Scenery
4. Privacy
5. Nature

The landowners were also asked what their important concerns are with their forestland. The top five concerns are:

1. Legacy
2. Wildlife
3. Vandalism
4. Trespass
5. Water pollution

When asked what they have planned for the next five years on their forestland, the top five responses were:

1. Grazing
2. Wildlife
3. Invasives
4. Fuels reduction
5. Remove trees

A special note concerning Tribal Lands:

Oklahoma is home to thirty-nine Native American tribes. Thirty-seven are federally recognized as sovereign nations and another has applied for federal recognition. According to the 2000 Census, Oklahoma is home to a population of more than 380,000 tribal members. The Cherokee Nation, located in Tahlequah, is the second largest tribe in the United States with over 222,000 members. Oklahoma's smallest tribe is the Modoc Tribe, headquartered in Miami, which has an estimated membership of 200. The state is served by two regional offices of the Bureau of Indian Affairs, located in Muskogee and Anadarko.

Historically, the area that is now Oklahoma was home to five tribes – the Osage, Caddo, Kiowa, Comanche, and Wichita. All other tribes were removed from their ancestral homelands to Oklahoma during the period known as the "Indian Removal."

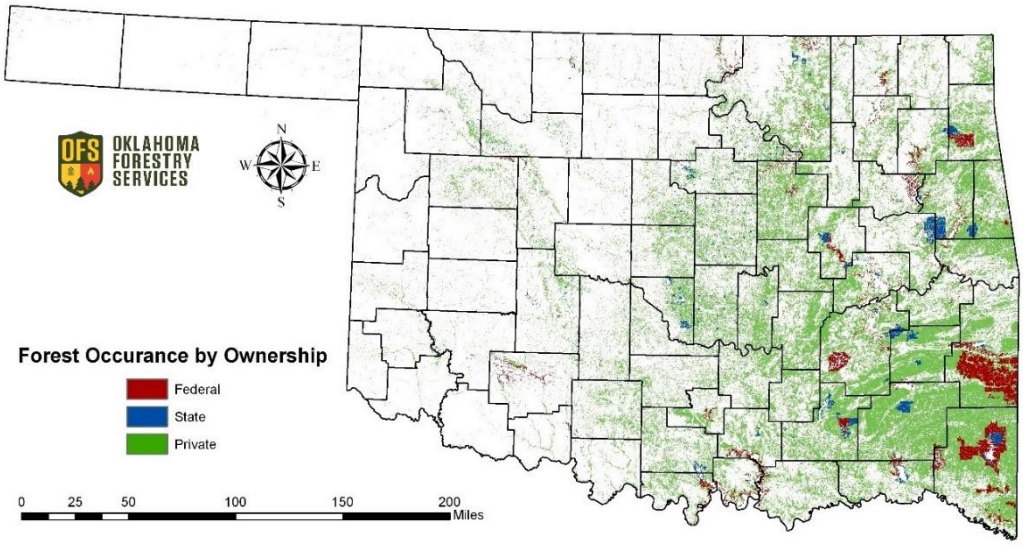
Oklahoma tribes are substantial landowners. For example, the Cherokee Nation is the beneficial owner of over 65,000 acres of tribal trust lands in northeastern Oklahoma, including an intact portion of its original reservation and tens of thousands of acres of trust lands within its treaty boundaries reacquired under the Oklahoma Indian Welfare Act of 1936 and the Indian Reorganization Act of 1934.

State and Local Government Forestland Ownership

State and local governments own over 1 million acres across the state and less than half of this land is forested. There are numerous city parks that make up parts of the community forests within the state. Oklahoma has 50 state parks that reflect the beauty and diversity of the state's forests and landscape.

Federal Forestland Ownership

There are over 1 million acres of federal land in Oklahoma and over 700,000 acres are forested. There is one national forest owned and managed by the USDA Forest Service located in southeastern Oklahoma. The USDA Forest Service also own and manage two National Grasslands in western Oklahoma, Black Kettle and Rita Blanca, which contain some small tracts of upland and bottomland hardwood forests. There are a few lands under the ownership of the Bureau of Indian Affairs but the majority of tribal lands are privately owned.



Oklahoma Forestlands by Ownership was created by merging a raster of forest distribution with a raster of each federal, state, and private land. The resulting merges were then color-coded for visibility.

Figure 16: Map of forestland ownerships.

As part of the USDA - FS Forest Inventory and Analysis (FIA) program, Oklahoma Forestry Services surveyed the eastern eighteen counties and is currently surveying the central and western counties. The FIA crews collect data on forest types and forest ownership and the table below outlines the ownership of the timberland or productive forests in the eastern eighteen counties (refer to map on page 38). Currently the best data for Oklahoma only includes the eastern counties but by 2018 the entire state will be inventoried completely for the first time and the numbers in the table below will likely change.

Table 24: Eastern Oklahoma, area of timberland (productive forestland) by ownership group.

Area of timberland by forest-type and ownership group, East Oklahoma, 2008						
Forest-type	All ownerships	U.S. Forest Service	Other federal	State and local government	Forest industry	Nonindustrial private
			thousand acres			
Softwood types (Pines and other softwoods)	1096.8	159.2	51.1	28.9	350.6	507.0
Hardwood types (oak, elm, ash, hickory, etc.)	3971.0	98.3	244.0	135.2	214.8	3278.6
Nonstocked	35.3	0.0	1.4	0.0	2.9	31.0
All groups	5103.1	257.5	296.5	164.1	568.3	3816.6

Source: Forest Inventory and Analysis Data for East Oklahoma, 2008

Table 25: Oklahoma land ownership patterns.

Ownership of Property	Acreage by agency	Total acreage	Forested acreage	Percentage forested
Private properties	>	**41,018,167**	**8,881,771**	**21.65%**
The Nature Conservancy	38,371			
Indian lands	1,391,949			
Other private owners	39,587,847			
Federal government	>	**1,290,336**	**754,801**	**58.50%**
Army Corps of Engineers	531,536			
Bureau of Indian Affairs	41,150			
Bureau of Land Management	320			
Bureau of Reclamation	49,575			
Department of Defense	148,323			
National Park Service	7,005			
U.S. Fish and Wildlife Service	118,619			
U.S. Forest Service	383,243			
Other federal agencies	10,565			
State and local government	>	**1,152,291**	**326,230**	**28.31%**
Grand River Dam Authority	82			
Dept. of Wildlife Conservation	300,046			
Tourism and Recreation Dept.	33,436			
School Land Office	772,784			
State Regents, other state agencies	17,761			
Local government	28,182			
Water		**493,766**	**35,800**	**7.25%**
State Totals		**43,954,560**	**9,998,602**	**22.75%**

Source: 2007 Statewide Comprehensive Outdoor Recreation Plan – Oklahoma Tourism and Recreation Department and Oklahoma Forestry Services for forested acres (This is currently the best data available on land and forestland ownership, data is subject to change).

Public Benefits from Oklahoma's Forest Resources

There are many public benefits and values provided by the state's forests. Some of the benefits provided are obvious but some tend to be overlooked and under appreciated by Oklahomans. The following section describes the many benefits and values Oklahoma's forests and trees provide to the state. It is important for Oklahoma natural resource agencies and organizations to work together to manage our forests and other natural resources so we can continue to enjoy the many benefits and values our diverse landscape provides.

Forest Products (Renewable Resource) and Landowner Income

Forest products bring a considerable amount of jobs and money into the state's economy. The best thing about forest products is that trees are a renewable and sustainable resource (unlike coal, oil, and natural gas). Forests can continue to be regenerated for present and future generations.

Forest products include:

- Timber (lumber for construction, flooring, molding, paneling)
- Pulp and paper
- Decorative products (vines, flowers, holiday season greenery)
- Herbal and medicinal products
- Edible products (fruits, nuts, honey, berries, mushrooms, etc.)
- Other non-timber products (specialty charcoal)
- Energy (biomass)

The traditional source of income for forest landowners is timber, but most of the forest products above can bring in some income but the markets are not as stable. Another value or form of income that comes from forest and trees is property value. Property values can be affected positively or negatively by the presence of certain trees. The Council of Tree and Landscape Appraisers (CTLA) developed techniques recognized by courts and insurance companies to assess the contribution of trees to residential property value. In this case tree values vary from case to case.

Table 26: Oklahoma manufacturing facilities and value of shipments.

Oklahoma Forest and Paper Industry		
Manufacturing Facilities	**# of Facilities**	**Value of Industry Shipments**
Sawmills, Millwork, Treating	3	
Engineered Wood and Panel Products	1	
Other Wood Products	1	
Total Wood Products	**5**	**$319,442,000**
Pulp, Paper & Paperboard Mills	6	
Converted Paper Products	31	
Paper Manufacturing	**37**	**$2,375,946,000**
Total All Segments	**42**	**$2,695,388,000**

Source: American Forest and Paper Association, 2015

Forest related jobs

The forest and paper industry in Oklahoma provides over 8,700 people with employment with an annual payroll income of over 450 million dollars. The forest sector directly contributed $3.3 billion in industry output.

Table 27: Oklahoma forest and paper industry employment and annual payroll income in 2016.

Direct Economic Contribution of Forest Sectors		
Sectors	Employment (No. of jobs)	Labor Income (million $)
Forestry	236	5.53
Logging	1,007	14.05
Primary solid wood products	1,083	71.23
Secondary solid wood products	3,516	129.33
Primary paper and paperboard products	1,900	166.31
Secondary paper and paperboard products	1,046	67.34
Total	**8,788**	**453.79**

Source: OSU Oklahoma Cooperative Extension Service – NREM 5056

Wildlife Habitat

Existing native habitats support locally healthy populations of migrating shore-birds and songbirds, such as Oklahoma's state bird, the Scissor-tailed Flycatcher. The forests support rich communities of songbirds, salamanders, deer, turkey, quail, squirrel and bats. Oklahoma's rivers support an impressive diversity of fish and freshwater mussels unique to eastern regions of the country and many of these species rely on riparian forests to moderate water temperatures and provide other elements of habitat. Small forest openings provide wildlife with early successional habitat needed by many species of wildlife. In the prairies of Oklahoma, globally rare species are found such as the Texas horned Lizard, the Loggerhead Shrike, and other prairie icons like the Black-tailed Prairie Dog, Long-billed Curlew, and Lesser Prairie Chicken.

Forests are critical to many threatened and endangered species. The Oklahoma Wildlife Action Plan applies a habitat-based approach to address the state's 250 priority wildlife species. The wide variety of wildlife provide for excellent hunting and fishing opportunities as well as wildlife observation.

Recreation

Outdoor recreation has seen a huge growth over the past 20 years and this trend is expected to continue. The most common outdoor recreation activities in which people indicated they participate were day hiking, fishing, and horseback riding. Many people enjoy getting away from all the commotion of daily life and spending time in "nature" around trees and wildlife. Some of the recreational activities include hunting, fishing, trail use, camping, parks, water sports, etc. Oklahoma's forest diversity offers plenty of opportunity to enjoy a variety of fall foliage.

In Oklahoma, hunting and fishing are recreational activities enjoyed by many residents as well as out of state visitors. In 2011, there were approximately 779,000 licensed anglers and hunters that accounted for roughly 1.5 billion dollars in retail sales (National Assembly of Sportsmen's Caucuses). There is a wide variety of habitats for aquatic and wildlife species throughout Oklahoma. Many landowners manage their forestland to attract wildlife for hunting purposes or to provide quality aquatic habitats for fishing.

Game species found within Oklahoma's forestlands include: bear, migratory game birds, deer, elk, furbearers, quail, pheasant, squirrel, rabbit, turkey, etc. There are set dates for each hunting season and a hunting license is required to hunt within the state. Oklahoma's abundant water resources host 176 species of fish. Some of the sportsmen favorites include: crappie, blue catfish, bluegill, brown trout, channel catfish, smallmouth bass, largemouth bass, striped bass, white bass, etc. There are many guidelines and regulations to follow to ensure safety and fun during a successful hunt or fishing adventure. There are over eighty wildlife management areas and other public lands managed for hunting and fishing purposes. Oklahoma Department of Wildlife Conservation is the best agency to contact about hunting and fishing opportunities.

Wetlands: Oklahoma is not typically considered to be a state in which wetlands are a major feature; however, there are approximately 733,000 acres in freshwater wetlands. Oklahoma supports many distinct types of wetlands, such as playa lakes, riparian wetlands, swamps, bogs, marshes, oxbow lakes, closed depressions, and cypress swamps (Oklahoma Conservation Commission, 2007).

Oklahoma ranks among the top ten states in the nation with over 60,000 acres enrolled in the Wetlands Reserve Program (NRCS, 2007). The Wetlands Reserve Program (WRP) is a voluntary program offering private landowners the opportunity to protect, restore, and enhance wetlands on their property. In parts of the state, the management of WRP lands consists of planting native tree species for wetland restoration purposes. In Oklahoma, as in many areas of the country, wetlands have been drained for agricultural uses. In the U.S., approximately 67 percent (nearly two million acres) of wetlands were removed from the landscape over the past 200 years. Both on a nationwide basis and in Oklahoma, bottomland hardwood forests have been hard hit. Properly managed wetlands provide excellent wildlife habitat especially for waterfowl. Wetlands can be a wonderful relaxing place to go to observe a variety of wildlife species.

Trails: About 40% of the population reports regular use of trails. Oklahoma reports approximately 600 miles of trails, almost entirely confined within single management jurisdictions, except for a few exceptions around the Tulsa area. There are many trails, across Oklahoma, which have a variety of uses such as hiking, backpacking, mountain biking, equestrian, and off road vehicles. Trail users in Oklahoma were surveyed and the top two reasons for recreational activity on trails are to enjoy nature and observe the scenic beauty.

The 2001 Oklahoma Recreational Trails plan concluded that the demand for trails is increasing and diversity of trail users is increasing. Trails are important considerations in community development as alternative transportation routes, green space, and linkages, properties that stimulate the local economy and properties that improve quality of life.

Parks: There are 50 state parks that provide excellent recreational opportunities in the forests. The state parks provide hiking and equestrian trails, canoeing, fishing, camping, cabins, etc. There are many recreational opportunities available at the state parks to get outside and enjoy nature and Oklahoma's diverse forest types.

Surface water and recreation: The forests and trees surrounding Oklahoma surface water (lakes, rivers, ponds, etc.) provide scenic beauty and quality water. Recreational activities on lakes and rivers are extremely popular. People enjoy canoeing, fishing, swimming, boating, and water sports on the abundant surface waters across the State.

Carbon sequestration

Carbon sequestration is the process through which carbon dioxide (CO_2) from the atmosphere is absorbed by trees, plants and crops through photosynthesis, and stored as carbon in biomass (tree trunks, branches, foliage, and roots) and soils. The term "sinks" is also used to refer to forests, croplands, and grazing lands, and their ability to sequester carbon. Agriculture and forestry activities can also release CO_2 into the atmosphere. Therefore a carbon sink occurs when carbon sequestration is greater than carbon releases over some time period. Planting trees to convert historic forest land back to forest cover is an activity that can increase carbon storage (US EPA).

Air Quality

Trees are air cleaning "machines." Forests and trees remove many pollutants from the atmosphere, including nitrogen dioxide (NO2), sulfur dioxide (SO2), ozone (O3), carbon monoxide (CO) and carbon dioxide (CO2). (See above carbon sequestration)

Clean Water

Forests protect water quality by slowing runoff, stabilizing soils, preventing erosion and floods, and filtering pollutants. Forest health of lands surrounding water supplies is vital to the integrity of water supply systems.

Energy Savings

Trees can provide energy savings to homes and businesses both in urban and rural areas. Trees planted properly around a home can keep a house cooler in the summer and warmer in the winter. Planting windbreaks and snow fences can also cut energy costs by adding a barrier from these hazardous weather events.

Quality of Life

Studies have shown that viewing trees can offer important physical and psychological benefits like lowering blood pressure, slowing heart rate, and promoting a sense of well-being. Viewing or being in nature has been shown to alleviate mental fatigue, heighten attention and focus, and lower levels of aggression. Forests and trees are important to society and help ensure Oklahoma residents' well-being and quality of life (US Forest Service). People also connect trees with specific events throughout their lives and value their significance like the Survivor Elm Tree in downtown Oklahoma City.

Phyto-remediation

The process of using plants and trees to clean up pollution in the environment. Trees have been shown to be effective in removing soil contaminants, such as heavy metals, petroleum products and chemicals. Trees can also help prevent wind, rain and groundwater from carrying pollution away from sites to other areas. Using trees to restore disturbed or contaminated sites can be an effective method of improving the environment at lower costs than other methods in most cases.

Food Source

Some of the trees in Oklahoma's urban and rural forests not only provide food for wildlife but they also provide residents with a local food source of fruits and nuts. Examples of trees and shrubs that provide a food source include: pecan, black walnut, sand plum, persimmon, chokecherry, mulberry, American plum and pawpaw.

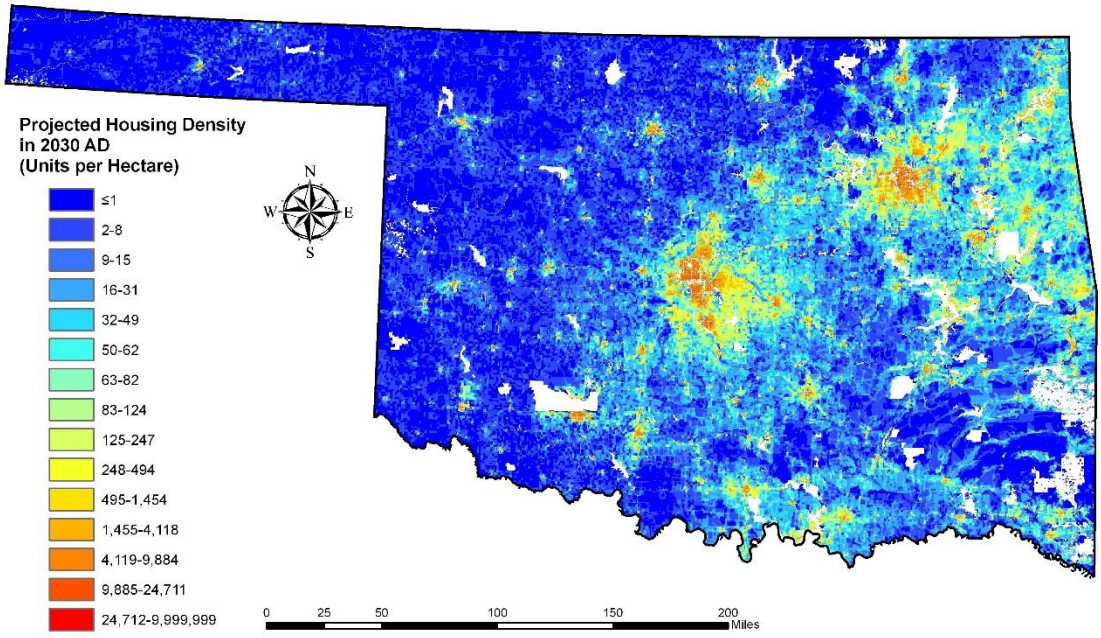
Reduction in Stormwater Runoff

Forested waterways can significantly decrease the amount of stormwater runoff because trees, other vegetation, and soils can absorb the water, filter the pollutants, and slow the flow. Stormwater runoff is rainfall that flows over the ground surface. It is created from rain falls on roads, driveways, parking lots, rooftops and other impervious surfaces that do not allow water to soak into the ground. Stormwater runoff is the number one cause of stream impairment in urban areas. These large volumes of water are swiftly flowing into our local streams, lakes, wetlands and rivers causing flooding and erosion, and washing away important forests and habitat for fish and wildlife that live in or around the water source. Stormwater runoff also carries a large amount of pollutants into the water supplies decreasing water quality.

Threats to Oklahoma's Forest Resources

This section briefly defines threats to Oklahoma's forest resources which will be discussed in further detail in the Critical Issues and Priority Forestlands Section.

Urbanization: Physical growth of urban areas into rural areas typically from population growth often causes loss or degradation of forestlands as well as loss of open space. Increasing housing density and associated development (such as power lines, septic and sewer systems, and shopping centers) can be linked to a decrease in native fish and wildlife and their habitats, changes in forest health, reduced opportunities for outdoor recreation, poorer water quality, altered hydrology, greater loss of life and property to wildfire, changes in traditional uses of forests, and decreases in the production of timber and other forest products.



This map depicts the results of the Spatially Explicit Regional Growth Model (SERGoM v2) as applied to the counties of Oklahoma. The analysis was completed by Dr. David M. Theobald, of Colorado State Univeristy (Theobald, D.M. 2005. Landscape patterns of exurban growth in the USA from 1980 to 2020. Ecology and Society 10(1): 32. [online] URL: http://www.ecologyandsociety.org/vol10/iss1/art32/), using 2000 US Census Bureau density data and County-projected population increases.

Figure 17: Map of projected development in Oklahoma by 2030.

Fragmentation: Isolation of forest tracts from one another affects landscape-level forest benefits. It generally results from parcelization of ownership, but can also be caused by introducing infrastructure (roads, power lines, pipelines, etc.) into the forest or even forest management activities that have the same effect. The fragmentation of ecosystems not only affects forest management but can also damage wildlife habitat as well as aquatic systems.

Parcelization: Division of ownerships often results in smaller holdings. This can result from inheritance of forests by multiple heirs, subdividing large blocks into smaller forest parcels or ranchettes, or sale of large holdings to multiple buyers or to single purchasers who in turn subdivide the land at some future date. Parcelization generally reduces the likelihood of active forestry or creates a more piecemeal approach to land ownership.

Wildland Urban Interface: These are areas undergoing a transition from forest and agriculture use to urban land uses. The interface involves a mixing of rural and urban land uses in the same area. Issues in the interface include greater conflicts between people and

natural resources, more social and political restrictions on forestry activities, increased risk of wildfire, loss of wildlife habitat and reduced water quality.

Changing land uses: Forests are constantly under pressure and being converted to non-forest uses. Riparian forests along rivers and water sources are being lost to cropland and development. Community forests and surrounding forest types are being lost to new construction of subdivisions and businesses. Forestlands are being converted to pastures for grazing and farming. Most of these land-use changes impact more than just the loss of forests, but also affect wildlife habitat, water quality and overall ecosystem health.

Changing markets: Oklahoma's forest product markets have recently declined and numerous sawmills have let employees go or even shut down. Because of current conditions with the forest industry, many landowners are not harvesting because prices are too low at local sawmills. Around the world there are new markets developing such as the use of biomass, biofuels, carbon sequestration and other ecosystem services but few have been established in Oklahoma. The declining forest industry in Oklahoma is currently negatively impacting Oklahoma's forest resources because there are few incentives for landowners to invest in forest improvement or even to keep their forests as forests. The pulpwood production in Oklahoma has been extremely volatile over the past 40 years. There was a peak in the industry in the early 1990s but in recent years the pulpwood production has declined (see Figure 18).

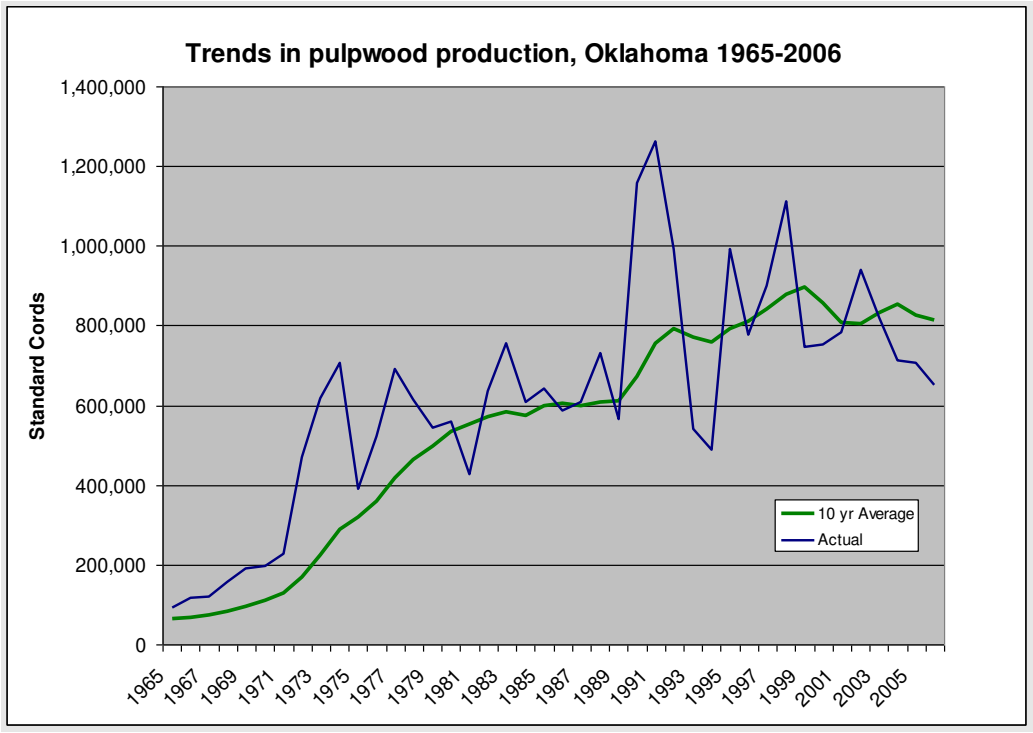


Figure 18: Pulpwood production in Oklahoma.

Source: USDA Forest Service – Trends in Southern Pulpwood Production, 2008.

Landowner income: Income plays a major role in the type and extent of forest management that will occur on given property. Oklahoma landowners have less disposable income to spend on forest management activities which in many areas has led to declining forest health. According to latest US Census data, Oklahoma's Per Capita Income at $27,432 (2018 Dollars) ranks 8th in the Southern Region. However, in the forested areas of the state Per Capita Income is much less than the State average. For example, in McCurtain County which is a state leader in forest products production, Per Capita Income is $19,692. The most current map available from the US Census (2010 Data) depicting Oklahoma's Per Capita Income is shown below:

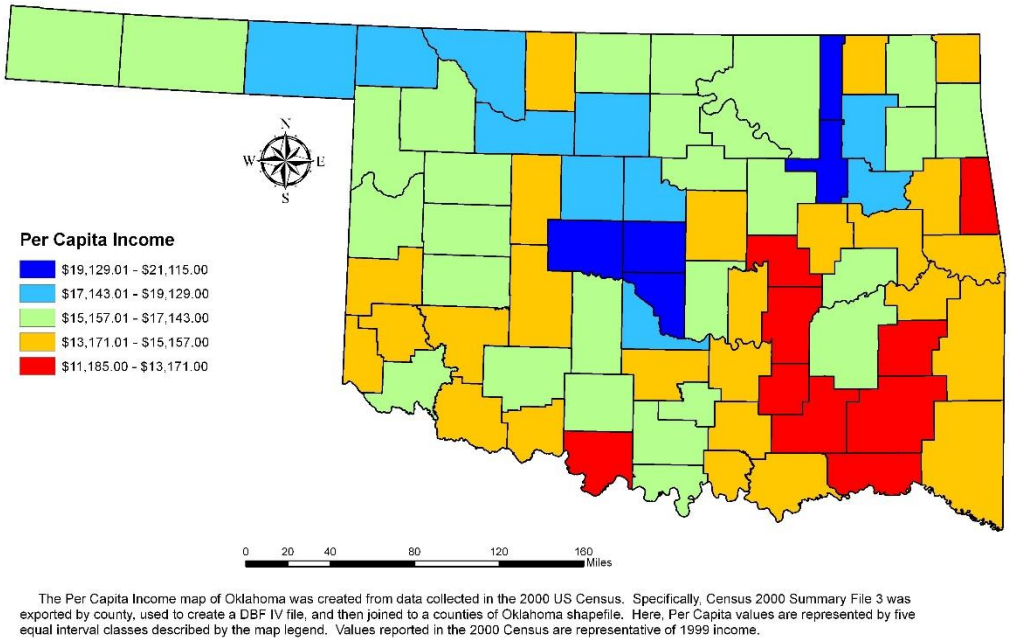


Figure 19: Map of per capita income in Oklahoma (by county).

Insects and disease: Currently Oklahoma has relatively minimal issues with forest insects and diseases. This is discussed further in the Forest Sustainability and Health issue description.

Exotic and invasive species: Invasive species can cause major issues with native ecosystems if they begin to invade and choke out native species. Some exotic and/or invasive species found in Oklahoma include: sericea lespedeza, Chinese privet, Japanese honeysuckle, salt cedar, etc. Some of these are discussed further in the Forest Sustainability and Health issue description.

Eastern redcedar encroachment: Many residents consider this the worst natural resource threat in the state, but more so on rangelands than in forested areas. There are many reasons why this tree species has rapidly increased in numbers across Oklahoma. Lands owned by passive investors, absentee landowners, and those not engaged in active management often tend to become dominated by eastern redcedar. Site domination by this tree species can be kept in check with intermittent fire. Eastern redcedar has been known to choke out hardwood species destroying valuable wildlife habitats and

damaging riparian bottomland hardwood and post oak-blackjack oak forest types.

Wildfire and fire suppression: Wildfires can pose threats to the forest resources, associated benefits and values, and Oklahoma residents. Therefore, a substantial allocation of both personnel and funding is utilized to actively suppress wildfires. Lack of active management across the landscape has allowed wildland fuel loads to increase within the forests. Many people have been moving to small forested tracts and often do not consider the wildfire risks associated with living in the rapidly expanding wildland urban interface. Striking a balance between utilization of prescribed fire and wildfire suppression has proven to be one of the most difficult challenges in recent years. Agency resources are obligated to protect life and property in effort to limit the threats of wildfire. There are tools and management options Oklahomans can utilize to increase their safety and to become more prepared for wildfires. Issue #3 characterizes wildfire risks in more detail.

Climate change: Oklahoma's forests and vegetation have always been subject to a changing climate and there is a constant battle between grasslands and forests across central Oklahoma. Oklahoma is known for extended droughts as well as having floods. The Oklahoma Climatological Survey has predicted some future changes that might occur with Oklahoma's climate.

Natural disasters: There are numerous weather events that often affect Oklahoma's forest resources such as tornados, ice storms, wind storms, droughts and hail. Oklahoma's weather, much like its landscape, is very diverse. The wide variety of weather does put stress on the vegetation and severe storms have drastically damaged urban and rural forests. Recent years have seen large, long-track tornados strike at the center of the state around some of the highest population centers. Since 2000, five major ice storms have left the forests across the state ragged. Large portions of western Oklahoma experienced a severe drought from 2010-2015. Urban and rural forests alike are impacted by these severe weather events.

Critical Issues and Priority Forestland Overview

Five critical issues related to Oklahoma's forests were identified through stakeholder and public input. Working groups analyzed and characterized the five issues in order to identify forestland areas at the highest risk.

These issues discuss the main problems or concerns Oklahoma's forest resources are facing. These issues impact or will impact the forest resources that provide Oklahomans with many benefits and values. Each issue is described in detail with maps that depict where the priority forest areas are in the state. The priority forestlands depicted by the five issues will determine where work and funding are focused in the State Forest Resource Strategy. The issue descriptions are specific to Oklahoma's forest resources, but priority forest areas connect with surrounding states allowing for multi-state interaction.

The five issue topics identified for Oklahoma are:

- Forest Sustainability and Health
- Wildfire Risk to the Forest Resource and Public Safety
- Forest Economics and Markets
- Water Quality and Availability
- Community Forest Health and Care

Oklahoma's Forest Action Plan supports the State and Private Forestry (S&PF) National Priorities and Objectives identified by the USDA Forest Service that support the goal of maintaining working forest landscapes. These national priorities and objectives will be used to identify where and how Federal resources should be focused in order to make the most significant progress in providing diverse and sustainable public benefits from trees and forests. The three S&PF national priorities are:

- Conserve working forest landscapes
- Protect forests from harm
- Enhance public benefits from trees and forests

The five critical issues identified for Oklahoma link to these national priorities. The goals and objectives in the State Forest Resource Strategy will help address state and national desired outcomes. Oklahoma plans to take actions to reduce the rate of conversion of forested landscapes to other uses and inform decisions about which landscapes should be conserved as working forests. Oklahoma also plans to take action to reduce threats to the forest resources, restore forest health and productivity, and enhance the suite of public benefits associated with trees and forests.

Issue 1: Forest Sustainability and Health

A healthy and sustainable forest is one that maintains biodiversity, productivity, and regeneration capacity for present and future generations. Oklahoma's forests provide numerous resources and benefits to society and the environment such as wood products, job opportunities, economic stability, wildlife habitat, clean air and water, erosion control, and recreational opportunities. Oklahoma's landscape is typically, though incorrectly, viewed as non-forested which has led to the loss of many forested areas. In actuality, Oklahoma has 11.8 million acres of forestland which is 26.9% of Oklahoma's 43.9 million acres of land area. According to the Oklahoma Forestry Code, a forest is defined as a tract of land that is at least ten percent (10%) stocked by trees of any size, whether of commercial or noncommercial species, or formerly having tree cover and not currently developed for non-forest use, including woodlands, woodlots, windbreaks, and shelterbelts.

For more than a century, Oklahoma's eastern forests have supported a strong forest products industry as well as provided many benefits to our state. Oklahoma's often overlooked and underappreciated central forests and western riparian areas are quickly being lost due to numerous factors including those stemming from the common misconception that there are no forests of any value in Oklahoma. The shorter hardwood tree species within the central and western riparian forests are important and valuable to our quality of life. These forests are less productive and do not provide as much economic benefit as eastern productive forests, but the central and western forests do provide scenic beauty, clean air and water, recreational opportunities, etc. Land-use changes, ecological pressures, economic issues, as well as landowner and societal influences are all threatening the health and sustainability of Oklahoma's forests. When the health and sustainability of Oklahoma's forests diminish, so do the associated benefits.

Oklahoma is a biologically rich and extremely diverse state with a landscape ranging from short grass prairies in the panhandle to loblolly pine forests and cypress swamps in the southeast. The diversity in the landscape offers a wide variety of benefits to the state including but not limited to: economic growth, recreation, wildlife habitat, clean air and water, aesthetics, and increased quality of life. Many people think of Oklahoma's landscape as flat to rolling grasslands with very few trees. This is true for parts of Oklahoma but there are approximately 11.8 million acres of forestland found within the state. Approximately 5.1 million acres make up the productive forestland or pine/hardwood forests located in eastern Oklahoma. Other forestland found throughout Oklahoma, such as the post oak-blackjack oak Cross Timbers area, the oak-hickory Ozark highlands and the numerous bottomland hardwoods located along the riparian areas are often ignored because they traditionally had little commercial value. These forested areas are rarely sustainably managed because there is a lack of awareness of the benefits these forests and trees provide, and there are few economic incentives to do so. It is important that all forests across Oklahoma are managed to maintain and enhance their productivity, health, and environmental benefits.

Forest sustainability is the ability to utilize forests in a manner and rate that maintains a forest's biodiversity, productivity, and regeneration capacity for present and future generations. Much of what we know about the health and sustainability of Oklahoma's forests is derived from the USDA Forest Service's Forest Inventory and Analysis (FIA) Program. FIA has established and measured a network of permanent sample plots in eastern Oklahoma for more than 75 years, starting with 5 counties in 1936. The survey was extended to the 18 eastern Oklahoma counties in 1976, and these plots were re-measured in 1986, 1993 and, most recently, in 2008. A low-intensity sample survey was conducted in the remaining 59 central and western counties in 1993. Starting with the new survey cycle in 2009, the entire state will be included in the standard FIA inventory from now on.

Concerns about the health and sustainability of Oklahoma's forests, although of a statewide nature, generally focus more on eastern Oklahoma where reliable data has been collected for a long period of time and where the majority of the State's productive forestlands and timber industry are located. Key measures of long-term sustainability may be found in part by estimates of total forestland, acres of timberland, growth and removals and land-use change.

The 2018 FIA survey, which provides the most recent data, estimated there were 5.57 million acres of forestland in the 18 Eastern counties, of which over 4.76 million acres are productive forestland.

This reflects a -3% change in total forestland estimates in the Eastern part of the state (FIA Units 1 and 2) from the 5.72 million acres of Eastern forest estimated in the 2015 inventory. Productive Eastern forestland estimates also changed by -3% from 4.91 million acres of Eastern productive forest the 2015 inventory. As a whole, though, it appears that forest regeneration, either by natural or artificial means, is offsetting potential losses to conversion. In 2018, the Eastern forest gained 68,304,288 cubic feet of wood after accounting for mortality and removals – over 91% of these gains took place in productive timberlands.

Another measure of resource sustainability is growth and removal data, also obtained from the FIA survey. In 1993, the overall average growth to removal ratio for softwoods was 2.07, and for hardwoods it was 2.71. In 2008, the growth to removal ratios were 1.02 for softwoods and 3.46 for hardwoods. In 2014, the ratio of growth to removal was 1.58 for softwood and 1.17 for hardwood. FIA data for 2018 estimates a net growth to removal ratio of 1.57 for softwoods and 1.90 for hardwoods. These positive ratios show that eastern Oklahoma's forests are currently growing more volume than is being harvested or lost to mortality, but Oklahoma's forests would benefit from increased regeneration of softwoods and more markets for hardwoods.

Western Oklahoma has completed its first FIA cycle and remeasurement data is being collected for the first time. While it will be several years before Western trends can be identified, it is important to establish a baseline of forested land. In the 59 counties that make up Western Oklahoma (FIA Units 3-7), there are an estimated 6.26 million acres of forest, of which 2.04 million acres are productive and 4.21 million acres are unproductive.

Oklahoma's landscapes are being reshaped by numerous land-use changes such as parcelization, fragmentation, wildland-urban interface expansion and other land-use conversion to non-forest uses or monocultures.

Parcelization is the division of ownerships that results in smaller holdings. This can result from the inheritance of forests by multiple heirs, subdividing large blocks into smaller forest parcels or "ranchettes" or the sale of large holdings to multiple buyers or to single purchasers who in turn subdivide the land at some future date. This tends to increase absentee ownerships (SGSF – Forest Parcelization and Fragmentation Issue paper) and make it more difficult to sell timber due to reduced volume.

Fragmentation occurs from land ownership parcelization but can also be caused by introducing roads, power lines, and other infrastructure. Forest tracts become isolated from one another which often constrains management options, impacts forest health, degrades wildlife habitat, impairs water quality, and ultimately leads to the loss of forests.

Another land-use change that is occurring on the outskirts of urban areas and around many of Oklahoma's man-made lakes is the wildland-urban interface. The wildland-urban interface is the area on the fringe of communities where structures and forests intermix. These areas are leading to management complications as well as increased wildfire complexity. The wildland-urban interface complicates how the land can be sustainably managed because of increased societal influences and more fragmented forests.

The long term nature of forest management discourages many people from establishing new stands of timber or maintaining current timber stands when compared to other land uses. This often leads to the loss of forest to pasture or cropland, which see a more immediate return on investment. Additionally many forest landowners convert native timber stands to loblolly plantation due to the increased economic potential for this species. This creates a monoculture, which has less ability to adapt to a variety of potential stressors.

The structure and composition of Oklahoma's forests are shifting away from historical conditions due to the public perception of fire, lack of active management, limitations to the variety of available management and climate change.

The data collected through the FIA program allows us to track many metrics of Oklahoma's forests. One of these metrics is the average density of our forests across the landscape. Comparison of data from 2011 and 2016 indicates that many of our forested acres are increasing in density. Forests require four things to grow and sustain themselves: light, space, nutrients and water. As the number of trees increases across a given piece of land a threshold is crossed where individuals are receiving fewer and fewer of these essential resources. This leads to a loss of vigor and reduced ability to withstand stress, which decreases productivity and increases mortality. Overly dense stands also decrease the diversity and abundance of understory vegetation, which is a critical source of habitat and food for a wide array of wildlife.

Table 28: Density trends of Oklahoma's forestland.

Acres of forestland by basal area	2015 Acres	2018 Acres
Total	12,284,180	11,839,462 (SE±129,050)
0-40 $ft^2 \cdot ac^{-1}$	4,097,008	3,580,665 (SE±124,965)
% of Total	33.4%	30.2%
41-80 $ft^2 \cdot ac^{-1}$	4,121,425	3,936,077 (SE±122,018)
% of Total	33.6%	33.2%
81-120 $ft^2 \cdot ac^{-1}$	3,057,207	3,199,915 (SE±108,157)
% of Total	24.9%	27.0%
120+ $ft^2 \cdot ac^{-1}$	1,008,540	1,122,805 (SE±68,491)
% of Total	8.2%	9.5%

This densification which leads to overstocked stands is due primarily to a lack of active management. Many of Oklahoma's forests were shaped by the regular occurrence of fire, but as settlement expanded across the country the risk of utilizing fire increased. With fire removed from the landscape and decreased active management, regeneration has proliferated to create overstocked stands where competition for resources is more extreme.

There are many forested acres which are currently not being actively managed. This stems from several factors. One of these is an increasing number of absentee landowners due in part to parcelization. Smaller tracts mean less income for forestry management service providers making it more difficult to receive services. The cost of those services is another impediment to active management. Revenue generation from forest management typically comes several years after the cost of many stand establishment and improvement practices. Another factor leading to unmanaged forest land is that the benefits provided to the public from forests, particularly those that don't have commercial value, are often unrecognized. This leads to less value being placed on the management of our forests.

On forested acres where active management is occurring, there may be a lack of variety in management options that is helping to create a less diverse forest and increasing the difficulty of managing poor quality stands. For most of Oklahoma's forest landowners the available services in the region lead to a vast majority of stands ending up in an even-aged or two-cohort condition. This structural homogeneity in combination with other reductions in diversity (species and understory) creates a stand which is more likely to succumb to a variety of stressors.

Economic downturns in the recent past have also reduced the variety of available management. Small-scale operations that performed activities like post-cutting or were willing to work on small tracts had to close down. This results in fewer landowners who have access to services and less potential for revenue from poor quality stands or those early in their rotation.

FIA data also provides a look into the species composition of Oklahoma's forests. Analysis of data from 2011 and 2016 could indicate that we are experiencing a loss of species diversity across the

landscape. The most prominent species (based on the number of live trees) around the state are starting to shift. Additionally, the most prominent species are representing an increased proportion of the total number of trees, which indicates that we could be losing our fringe or more niche species. It is important to remember that one set of comparisons is not sufficient to draw definitive conclusions, but it does highlight the importance of continuing these evaluations to have more reliable trend analyses. Furthermore, identifying the cause of these shifts is a significant challenge. It is likely that there are a combination of factors influencing these changes, some of which were covered above.

Climate change is another factor which may be influencing the composition of our forests. It is important to explore the potential impacts of climate change in Oklahoma and their effects on the state's forest resources. It is likely that those changes may be expressed more clearly at the fringes of ecosystems - in Oklahoma and Texas for example - than in other states in the southern region. Oklahoma is at the western fringe of several forest types, including southern pines, eastern hardwoods and coastal plain bottomlands; and the eastern fringe of others, including pinyon-juniper, ponderosa pine and woody species of the desert southwest. The oak-hickory forests of the Cross Timbers occupy an extensive transition zone between native forests and prairies through central Oklahoma.

Although the role of forests in mitigating global climate change remains uncertain at best, professional foresters and the forestry community are prepared to contribute to the overall strategy. It is important to explore the potential impacts of climate change in Oklahoma and their effects on the state's forest resources. Despite the uncertainty about the reality and causes of climate change, it is important to recognize that:

- Natural landscapes are dynamic and our forests will be affected by climate change,
- There are things we can do now to increase the likelihood that our forests will continue to flourish, whether climate change predictions come true or not, and
- Forestlands and forestry can be part of a planned response to mitigate the impacts of climate change on people.

Along with landowner and societal influences, there are also ecological pressures that affect the health and sustainability of our forests. There have been and will be disasters, storms, insects, diseases, and invasive species that impact the health of Oklahoma's forests.

Numerous natural disasters, including ice storms, tornados, flooding, severe thunderstorms, and strong winds, can be harmful to the health of the forest resources depending on the severity of an event. Each year, it is estimated that over 348 million trees in Oklahoma are affected by disturbances. To add to the health risks, some non-native seed sources are being used for reforestation purposes. In some cases, non-native seed sources not as adapted to Oklahoma's climate are used for reforestation due to other more desirable characteristics, which can lead to greater risk of disease, pest outbreaks, and reduced resiliency.

Some of the pests or damaging agents that have threatened or could threaten the health and sustainability of Oklahoma's forests include but are not limited to:

Insects

- Emerald Ash Borer (EAB) – EAB is a pest that has been present in the United States since the early 2000's. In that time it has continuously spread from its original infection point around Detroit, MI with its primary vector of transportation being firewood. To date, Oklahoma has only had one confirmed case of emerald ash borer having been found in a trap in Grove in 2016. According to the 2014 FIA data across the entire, Oklahoma has an estimated 166 million ash trees which is

three percent of the estimated total of the State's live trees. Ash is a common tree in many of Oklahoma's riparian areas as well as appearing across other forest types throughout the state. Furthermore, ash remains a common species planted throughout many urban areas across Oklahoma.

- Imported Gypsy Moth – Gypsy moth feeds on foliage of oak, hickory and other hardwood species to the point of defoliation, reducing tree vigor. It frequently returns to the same area annually, and can eventually cause mortality. It is well established in the Eastern United States and focus has been placed on slowing its spread as eradication is not a viable option. The Oak-Hickory forest type is the most prevalent in Oklahoma, making up an estimated 6.7 million acres and is the forest type most at risk to this pest. There has been only one confirmed case of Asian gypsy moth in Oklahoma, found in 2014 in McAlester, and no cases of European gypsy moth.
- Imported Sirex wood wasp – Sirex woodwasp is a pest to multiple pine species including shortleaf and loblolly pine, both of which are common species in Eastern Oklahoma. The first established population of this wasp in pines was found in 2004 in the Northeastern United States. In that time it has not spread far with the closest population to Oklahoma being Michigan. At this time this pest does not appear to pose a significant threat to Oklahoma's pines due to its distance, low rate of spread, and pattern of attack. Proper forest management acts as the greatest method of prevention for this pest.
- Pine Bark Beetles: Southern Pine beetle (SPB) and Ips – SPB and three species of Ips are native pests to Oklahoma's pine forests. Both borer into the tree and feed on the tree's phloem. SPB has the highest potential of damage as it attacks trees in groups, expanding its population outward and potentially causing mortality measured in acres. However, SPB outbreaks are rare in Oklahoma with the last one being in 1999. Ips is significantly more common, occurring to some degree every year. However Ips target only individual trees that are in decline or stressed. Mortality occurs in a scattered pattern across as stand. Though rare, outbreaks of Ips can occur as was seen in 2015-2016. This outbreak was in response to a severe drought in the area causing increased levels of stress across a majority of the pine forests of Southeastern Oklahoma. Maintaining proper stocking levels through good forest management act as the best prevention for both of these pests.
- Asian Longhorned Beetle (ALB) – ALB first appeared in the Northeastern United States in 1996 and has spread to a few Midwestern states. This pest is primarily a threat to urban forests though there have been some documented cases of it occurring in more rural forests as well. Localized eradication efforts have proved successful in some of these states.
- Soapberry Borer – A relative of the emerald ash borer, this pest behaves in much the same was as EAB. As the name suggests, this beetle's host is western soapberry, a fairly common tree in the scattered forests of Western Oklahoma. Soapberry borer has not yet been found in Oklahoma, but it is present in Texas near the state border. While not an economically significant species, western soapberry offers multiple ecological benefits to the western half of the state.

Diseases

- Chestnut Blight – In Oklahoma, this disease is limited to the Ozark Chinkapin that occurs in the northeastern counties.
- Dutch elm disease – A serious elm disease common in urban areas that has destroyed many of the stately elms that once graced our city streets.

- Diplodia and Dothistroma – These fungal blights affect ornamental and windbreak pine species.
- Oak Decline – Oak decline is a term given to a complex of factors, both biotic and abiotic. Drought, poor/shallow soils, and overcrowding can weaken the trees allowing secondary factors such as insects and diseases to establish themselves. One of the most common fungal pathogens in Oklahoma is Hypoxylon canker, a secondary disease commonly associated with oak decline.

Plants

- Chinese Privet – Privet is an invasive shrubby species, introduced in the mid 1800's, that occupies the forest understory across Oklahoma and can hinder reproduction of native trees. It was planted initially as an ornamental in urban areas but has escaped. Privet is easily spread as its berries are eaten by birds and other wildlife. It's roots also send up multiple shoots allowing it to take over an area once it is established.
- Salt Cedar (Tamarisk) – Salt cedar is encroaching on riparian areas in western Oklahoma, including the Canadian River system. It is a serious pest because it reduces streamflows, displaces desirable vegetation and is difficult and expensive to control.
- Russian and Autumn Olive – Both species of Olives have been present in the Southeastern United States for over a century. Widely planted in disturbed and cleared areas as ornamentals, shelterbelts, or mine site reclamations. They can form thickets outcompeting native reproduction.
- Kudzu – Kudzu is yet another escaped ornamental which was also utilized as a method of erosion control. This vine has a fast rate of growth and is able to cover anything in its path including trees. Eventually, a population of kudzu could cover an entire area, killing anything it grew over while also preventing any regeneration beneath it. While not widespread, it has been found in multiple locations across the eastern half of the state.
- Eastern Redcedar – Redcedar is an opportunistic native juniper species that has encroached the understory of forests, ranging from eastern hardwoods, Central Cross Timbers, hardwood bottomlands and riparian areas, as well as open rangelands and prairie systems. As a highly shade tolerant species, eastern redcedar has established itself in the understory of hardwood stands. As the overstory dies, often through the oak decline complex, eastern redcedar readily replaces the fallen hardwood. Historically, frequent fires worked to reduce eastern redcedar in the understory and grasslands, but due to fire exclusion its' population has increased. Where present it has the potential to increase wildfire severity.

Opportunities

Opportunities related to this issue include:

- Improve the understanding of and information on Oklahoma's forest resource.
- Oklahoma's forests are already on the edges of their native ranges; improve their resilience through increased forest management and the use of prescribed fire.
- Promote favorable economic conditions which allow for implementation of forest management activities and discourage conversion of forestland.
- Encourage education programs for both the public and natural resource professionals.

The Oklahoma Forest Resource Strategy discusses these opportunities and sets specific goals and objectives to address issues which link to these national priorities:

- Conserve Working Forests
    - Objective: Identify and conserve high priority forest ecosystems and landscapes
    - Objective: Actively and sustainably manage forests
- Protect Forests from Harm
    - Identify, manage, and reduce threats to forest and ecosystem health
    - Restore fire-adapted lands and reduce risk of wildfire impacts
- Enhance Public Benefits from Trees and Forests
    - Protect, conserve and enhance wildlife and fish habitat
    - Improve air quality and conserve energy
    - Assist communities in planning for and reducing wildfires
    - Maintain and enhance the economic benefits and values of trees and forests
    - Protect, conserve and enhance wildlife and fish habitat
    - Connect people to trees and forests and engage them in environmental stewardship activities
    - Manage and restore trees and forests to mitigate and adapt to global climate change.

Issue 2: Wildfire Risk to the Forest Resource and Public Safety

The threat of wildfire and associated impacts on both Oklahomans and native ecosystems is an issue throughout the State of Oklahoma. Those impacts are both complex and challenging in that fire is critical to the health and sustainability of the Oklahoma landscape, however the increase in catastrophic wildfire impacts mandate more effective and intensive fire suppression efforts. Wildfires often cause damage to forestlands, endanger firefighters and threaten public safety and property. State and federal natural resource agencies expend a considerable amount of their annual budgets on wildfire suppression to prevent these unwanted consequences. They also dedicate considerable funds implementing prescribed fire on the landscape during specified conditions to achieve resource management objectives including restoration and maintenance of ecosystems and reduction of hazardous fuels. Very often those two objectives work hand in hand and promote lateral benefits for both reduction of catastrophic wildfire effects and maintenance of healthy native landscapes.

Since the last revision of this document in 2015, Oklahoma has been on the top ten list of most acres burned by wildfire in the United States. The statistics found in *Table 19* were sourced from the National Interagency Fire Center (NIFC), data for 2019 was not available when this document was written.

Table 29: Top ten states of acres burned by wildfire.

Annual Wildfire Acres			
2018		2017	
State	Acres Burned	State	Acres Burned
California	1,823,153	Montana	1,366,498
Nevada	1,001,966	Nevada	1,329,289
Oregon	897,262	California	1,266,224
Oklahoma	745,097	Texas	734,682
Idaho	604,481	Oregon	714,520
Texas	569,811	Idaho	686,262
Colorado	475,803	Alaska	653,023
Utah	438,983	Oklahoma	502,625
Washington	438,833	Kansas	476,306
Alaska	410,683	Arizona	429,564
2016		2015	
State	Acres Burned	State	Acres Burned
Oklahoma	767,780	Alaska	5,111,404
California	560,815	Washington	1,137,664
Alaska	496,457	California	893,362
Idaho	361,649	Idaho	804,094
Texas	356,680	Oregon	685,809
Kansas	349,829	Montana	351,264
Arizona	308,245	Texas	184,418
Washington	293,717	Arizona	160,152
Nevada	265,156	Oklahoma	100,382
Oregon	219,509	Florida	73,432

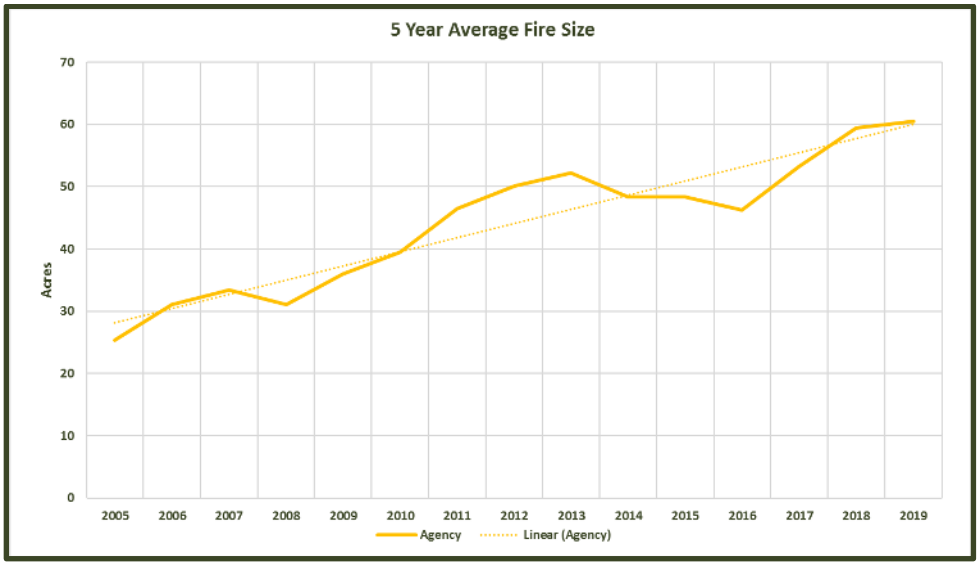


Figure 20: Five year average fire size in protection area.

The five year average fire size (*Figure 20*) for OFS's primary protection area has been increasing since 2001. The complexity of identifying causal factors to this trend is immense. It is highlighted here to demonstrate that the risk of wildfire in Oklahoma is not negligible and emphasize the importance of implementing wildfire risk mitigation practices.

Oklahoma's diverse landscape, especially its forests, provide our citizens with many natural resources and benefits including clean water, wood products, tourism and recreation opportunity, wildlife diversity, and natural aesthetics. To the typical citizen wildfire may only be considered a risk when structures and lives are threatened, but wildfire also threatens the forest resource and investments landowners have made in forest management practices. A catastrophic wildfire sets back hardwood succession, destroys investments in pine plantations and degrades wildlife habitat. Wildfires also damage and destroy property, including homes, local businesses, recreational and tourism opportunities and historical sites.

The accumulation of wildland fuels combined with a growing population in a state where the majority of fires are human caused, are the primary factors contributing to the frequency and severity of wildfires in Oklahoma.

Oklahoma's climate allows for abundant annual vegetation growth. That growth, coupled with land-use changes and the lack of appropriate land management practices allows for excessive accumulation of wildland fuels. This results in increased wildfire severity during extreme weather events. If the changing climate results in a longer growing season as some models suggest, this could further increase fuel loads.

Successful fire suppression without the use of supplementary fuel reduction techniques contributes to the build-up of wildland fuels. Urban and rural development continues to increase the necessity of fire suppression, while making it more difficult to implement mitigation practices. Additionally, it is often the case when budgets are limited that when money is spent on fire suppression it leads to less money being available for prevention and mitigation activities.

Fuel reduction practices are effective at reducing the accumulation of fuels, but unfortunately management options are often limited. Mechanical fuel reductions are typically cost prohibitive and markets for the resulting biomass are virtually nonexistent. The use of prescribed fire for fuel reduction is the most cost effective option, but comes with a host of difficulties.

Prescribed fire is wrought with complexities of which increasing interface and excessive fuel loading complicates the fire environment. Additionally, smoke management considerations, increasing fragmentation of ownership as well as liability issues complicate prescribed fire implementation. While prescribed fire is a proven and effective management practice it is not appropriate for all situations as there are many factors to consider before implementing a successful prescribed burn.

Additionally, wildfire complexity has also increased because of factors that also prove challenging for prescribed fire implementation including expanding urbanization, increasing development of "mini-farms" and "mini-ranches" and parcel fragmentation as well as the resultant increasing wildland-urban interface. This interface is where homes and other human development are intermixed with wildland fuels and other undeveloped lands. People and improvements in the wildland urban interface are at a higher risk because of lagging or inadequate wildfire preparedness practices.. The number of Oklahoma communities that have a Community Wildfire Protection Plan continues to increase, however most communities lack a comprehensive plan. Also, there are no appreciable incentives such as reduced insurance rates or building codes to address the issue of people migrating to the suburbs and not being prepared for wildfire risks.

There are numerous areas in Oklahoma where the wildland urban interface situation directly correlates to increase the wildfire risk of the area. Examples include community developments surrounding Lake Texoma in the south central portion of the state, Grand Lake and Lake Tenkiller in the northeastern portion of the state and the Hochatown/Broken Bow Lake area of the southeast. The Hochatown/Broken Bow Lake area (*see figure 21)* is typical of Oklahoma's wildland-urban interface situations. This area has thousands of homes and cabins that have been built intermingled in the forested areas adjoining the lake. Many of these homes and cabins are built where there is poor ingress/egress for firefighting equipment and resource response, limited firefighting capacity, few water sources, poor mapping/identified evacuation routes and within challenging fire environment . To exacerbate the problem, most structures are surrounded by an abundance of volatile fuels lacking defensible space. These homes and cabins within the wildland-urban interface are at risk because wildfire preparedness planning did not occur prior to development. Complicating the potential problems, these cabins contribute millions of dollars to the local economy through rentals and other recreational activities. Revenue generation has encouraged continued development that is pushing construction into areas with even more difficult access, rugged ground and hazardous fuels. A catastrophic event in this area would severely impact the local economy and livelihoods of those dependent upon the revenue generated from rental and recreation amenities. A number of fire prevention, preparedness and planning measures are being developed to adequately reduce the risk of a catastrophic wildfire in this area.

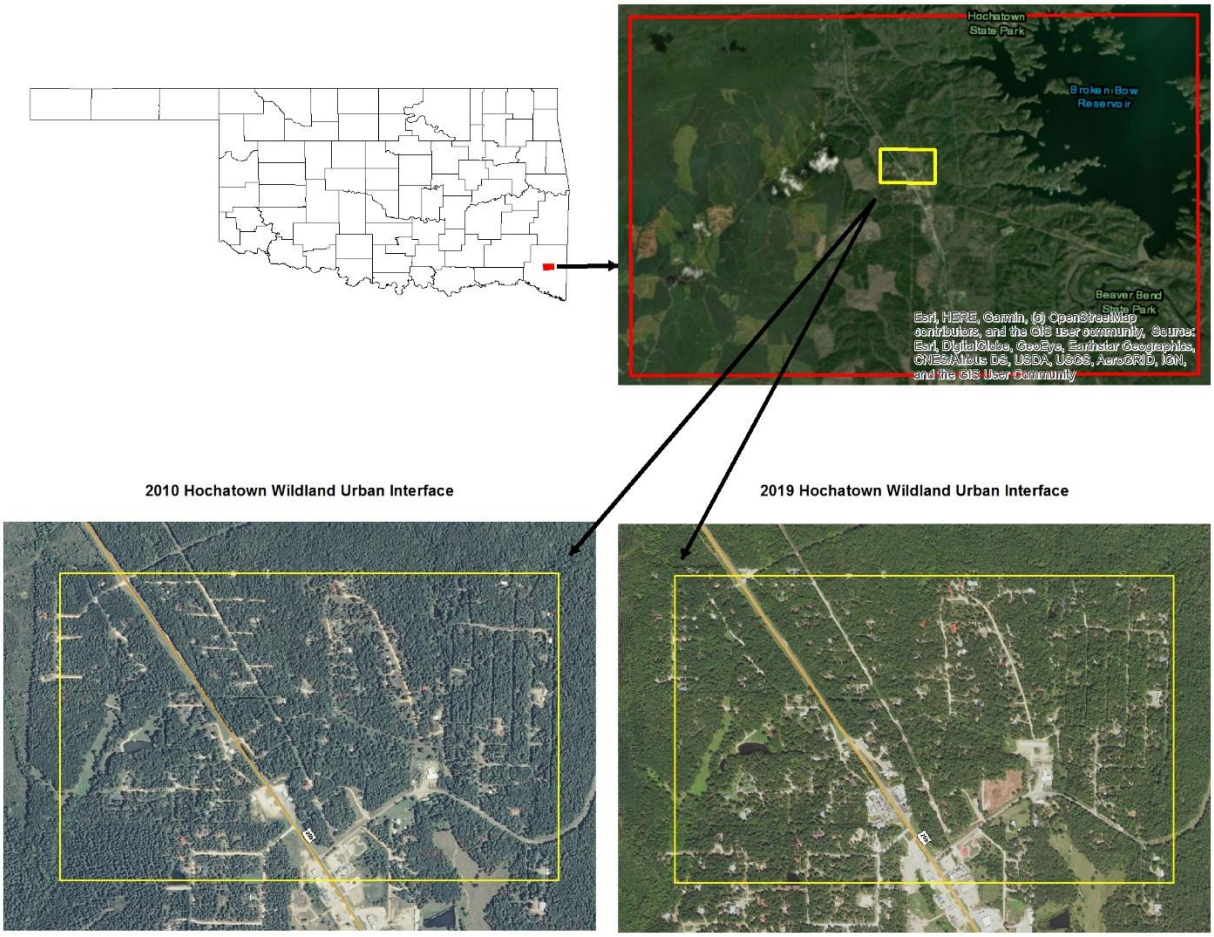


Figure 21: Hochatown area WUI change from 2010 to 2019.

There are many reasons why wildfire severity and catastrophic wildfire events have increased over the years in Oklahoma. Perhaps the most significant contributors to Oklahoma's wildfire occurrences are extreme weather conditions prompted by climatic shift and pronounced wet/dry cycles where strong growth precedes onset of drought development. According to the Oklahoma Climatological Survey, the climate transitions from the moist subtropical climate in eastern Oklahoma to a semi-arid climate in western Oklahoma. This transition between climate classifications allows for frequent hazardous weather events such as tornados, severe thunderstorms, flooding, drought, extreme temperatures, and winter ice storms. Vegetation that is stressed or damaged by these weather events contribute to the amount of fuel available to burn during a wildfire. These fuel conditions are often exacerbated by prolonged periods of dryness extending over a season or longer.

Losses from wildfire are increasing with current climate variation prompting intensified periods of wildfire activity concurrent with changing land use and management activities. Land use changes also result in fuel-type changes. Central and western Oklahoma is experiencing considerable expansion of Eastern redcedar coverage and density on poorly managed or unmanaged lands. Southeast Oklahoma is seeing an expansion of pine plantations replacing native pine-hardwood forests. Statewide, urbanization and rural development are increasing. All of these factors contribute to a more complex fire environment where potential for losses are increased.

Human related ignitions cause the majority of wildfires in Oklahoma. Unfortunately, this fact is likely to continue. Due to the number and severity of wildfires in Oklahoma, existing state funds are expended on fire protection resources and suppression efforts. This often means there is less money available to use for prevention, mitigation and management practices.

Accurate and timely fire reporting is an issue nationally and Oklahoma is unfortunately no exception. Oklahoma Forestry Services utilizes an on-line reporting application for fire departments, however accurate reporting with regard to occurrence numbers and location are lacking due to participation being entirely voluntary. Analysis of trends, identification of high occurrence areas and severity monitoring are complicated by inadequate reporting. From 2010 through 2019, Oklahoma Forestry Services responded to over 9,500 fires in the protection area totaling just over 500,000 acres. These fire suppression efforts have saved over 8,000 structures with a value of approximately 275 million dollars. Due to data limitations, the above numbers only include a small amount of the actual fires that have occurred in Oklahoma.

Multiple examples of the impacts of catastrophic wildfires have unfortunately occurred and seem to be increasing in trend. The cities of Choctaw and Midwest City are examples of what happens when a community finds itself in the path of a wildfire. The Choctaw/Midwest City fire occurred on April 9, 2009 and is a prime example of a wildfire in the wildland-urban interface. This fire burned 3,475 acres, injured close to 60 people and destroyed over 200 homes. This particular incident is frequently referenced either directly or indirectly as a point in time highlighting the ever increasing wildfire threat in Oklahoma. In more recent history, there are a number of wildfires that have resulted in catastrophic outcomes. The Anderson Creek Fire burned 376,620 acres and NW OK Complex burned 779,292 acres. Both of these fires crossed both state lines and geographic coordination center boundaries resulting in significant losses including lives and improvements. The Rhea Fire, another fatal fire, consumed 286, 196 acres also resulted in significant damages and a lengthy commitment of incident responders. All three of these fires are representative of the increasing complexity associated with changing fuel-scapes and increasing periods of high-end fire weather occurrence.

Opportunities

Opportunities to mitigate wildfire risk and promote healthy, native forests, woodlands and wildlands in Oklahoma abound. Educating Oklahomans and communities with regard to the risks of wildfire, benefits of maintaining healthy and resilient ecosystems as well as the role of prescribed fire in those ecosystems is paramount to success in reducing the associated hazards. Implementing and demonstrating sound practices is required to adequately establish sound and effective methods for maintaining forest, woodland and wildland health and sustainability.

The Oklahoma Forest Resource Strategy discusses these opportunities and sets specific goals and objectives to address issues which link to these national priorities:

- Conserve Working Forests
    - Objective: Implement and demonstrate prescribed fire effectively within stewardship plans in fire-dependent forests and woodlands.
    - Objective: Educate landowners and communities with forests and woodland holdings on additional forest management practices that increase effectiveness of prescribed fire in effort to achieve resource management objectives.
- Protect Forests from Harm
    - Objective: Encourage development of fire adapted landscapes in an effort to reduce risk of wildfire impacts through analysis of risk and communication of appropriate mitigation and management practices.
    - Objective: Assist property owners, communities and NGO's in developing management practices consistent with risk analysis and with focus on fire adaptation consistent with sound forest management.
    - Objective: Train firefighting personnel in safe, effective and efficient wildland firefighting tactics that are commensurate with the fire environment prevalent in Oklahoma's forests and woodlands.
    - Objective: Increase wildland firefighting capacity internally as sustainable funding permits and support increased capacities within rural and community fire departments when feasible.
- Enhance Public Benefits from Trees and Forests
    - Objective: Assist communities in identifying and reducing wildfire risks through cost-effective practices.
    - Objective: Continue promotion of hazard mitigation planning with focus on action alongside property owners by encouraging responsibility and protection of investments in homes and improvements.
    - Objective: Promote resource management objectives and practices that utilize ecological burning considering habitat that promotes healthy and sustainable populations of native wildlife.
    - Objective: Connect people to the role that fire plays in the fire dependent ecosystems prevalent across Oklahoma.

Issue 3: Forest Economics and Markets

Traditional forest products markets are changing or lack stability, causing great uncertainty among landowners and the communities that rely on the industry for jobs and economic growth. Although interest in ecosystem services and non-traditional wood products markets is increasing (carbon, biomass and bio-energy, recreation, water and wildlife), market mechanisms are not well developed. Conflicts are likely to develop between new and traditional wood product markets. We must be able to address questions of resource sustainability at the local level; therefore access to forest inventory data statewide is essential. The economic contribution of forestry to the state can increase substantially with better resource management and incentives, and focused attention on the new emerging markets.

Issue Description

According to OFS analysis, Oklahoma has an estimated 12.5 million acres of forestlands, with approximately 90% privately owned. Oklahoma's private forestlands have supported traditional timber harvesting and wood processing activities for more than 130 years, with intensive silviculture in practice for the past 40 years in eastern Oklahoma. In addition to these traditional markets, numerous small-scale and specialty markets have developed, but with much less consistency. Oklahoma's forests can bring economic growth to local communities by providing job opportunities and money, but they also provide our citizens with numerous benefits like clean water and air, wildlife habitat, erosion control, and recreational opportunities.

In 2013, Forest2Market Inc. produced a report that described the economic impact of privately owned forests across the United States. That report showed privately owned forests are an important part of the Oklahoma economy where forest product manufacturing is 4.77% of the state's total manufacturing output. These forests employ active management techniques (land management planning, fertilizing, planting, thinning, and harvesting) to produce timber, logs, pulpwood, chips, posts, poles and wood fuel. These outputs are then used by manufacturers to create higher value wood products such as paper, energy, etc. According to the report, each job in a forestry related industry creates 1.8 jobs in other industries and on average each 1,000 acres of privately-owned forest is responsible for the creation of 8 jobs.

The table below illustrates the economic impacts of all of Oklahoma's forests.

Table 30: Economic impacts of Oklahoma's forests.

	Direct Impacts	Indirect/Induced Impacts	Total Impact
Employment	6,777	11,250	18,027
Annual Payroll	$198,829,724	$386,965,328	$738,633,292
Annual Output	$2,947,141,214	$1,562,277,676	$4,509,418,891
Value Added	$1,145,324,102	$851,133,768	$1,996,457,870

Source: OSU NREM - 3056

The economic downturn in the national economy in 2008, and especially the housing market, had a serious impact on the state's forest products sector. The number of small sawmills dwindled to its lowest level in recent history. The Weyerhaeuser Company's large pine sawmill at Wright City, in continuous operation since 1910, announced its closure in March 2009, putting 200 mill employees out of work.

In 2015, due to a rebound in the national economy, recent activity at other large mills such as Huber's OSB plant, Pan-Pacific's MDF plant at Broken Bow, and Weyerhaeuser's sawmill at Idabel have been running at capacity. Valley Timbers sold their operation to Langdale Lumber and is using more wood than ever. The logging infrastructure is now somewhat reduced because of the previous downturn but work in the woods has increased since 2010. Support industries, such as consumer goods and services, equipment sales and services, and food and retail businesses are also seeing benefits from the uptick in the industry.

Oklahoma's forest industry struggled primarily due to: the housing market that imploded due to the financial crisis and loss of mortgage lines of credit in 2008-2009; high warehouse inventories of construction materials; reductions in consumer use of paper goods as they scaled back their purchasing; changes in the packaging industry; and capital investment needs to maintain the viability of older mills. The loss of markets provided a serious deterrent for landowners to consider investing in their forestlands, resulting in reduced site preparation and tree planting activity with corresponding negative impacts on forestry contractors, reduced seedling sales, reduced chemical applications, etc. Fewer forest improvement practices in the short run may lead to increased wildfire risks and increased losses to forest pests if stands begin to stagnate.

Oklahoma's traditional forest products markets have contracted, and non-traditional markets for the wood products and natural resources of the forests are currently limited. Eastern redcedar continues expansion on central and western Oklahoma rangelands and forestlands, changing the makeup of existing ecosystems and increasing wildfire risk and complexity. Although redcedar wood contribute economic value through a variety of use-applications including bioenergy, its use is inconsistent and occurs only on a small scale relative to its potential. In areas where it is common lack of established logging infrastructure hampers its utilization. Eastern redcedar is not the only non-traditional market opportunity in the state; it is just so widespread that a market could possibly be established. Non-traditional markets and products need to be identified and established within the state to provide landowners with more incentives to practice sustainable forestry.

As fragmentation of forest ecosystems occurs all across Oklahoma's landscape, forestry no longer remains the most attractive option for some landowners. There are many human activities that cause fragmentation to the forestland in Oklahoma. Some landowners are managing their land for objectives that will bring in the most income and typically more income can be made by fragmenting the landscape into smaller tracts of land to allow for real estate development. Landowners that are trying to manage their forests properly are struggling because smaller and limited markets reduce their ability to apply some forest management practices. This threatens the forest resource due to inadequate reforestation and stagnant forest stand conditions. A natural fragmentation also occurs within the different ecoregions due to characteristics of the landscape and climate. Examples of this natural fragmentation can be seen in the western Oklahoma forests found mostly along waterways.

The priority forestlands identified for the Forest Economics and Markets Issue are illustrated in the map on the next page. To create this map of priority forestlands, several geospatial data layers were analyzed by Oklahoma Forestry Services; details of the models and analysis utilized can be found in Appendix E.

Opportunities

In addition to the opportunities for expanding the eastern redcedar industry, there are also opportunities in biomass for energy. Ecosystem services is becoming a more popular term across the United States to describe all of the often overlooked free benefits and resources provided by forests. Existing smaller markets such as hunting leases, ATV trail riding leases, and other forms of recreation can be expanded. Since Oklahoma has such a diverse landscape and certain forest types currently have little or no commercial value, developing new markets for the ecosystem services they provide is a great opportunity for the state to enhance, protect, and conserve our forestlands.

The Oklahoma Forest Resource Strategy discusses these opportunities and sets specific goals and objectives to address issues which link to these national priorities:

- Conserve Working Forests
    - Objective: Actively and sustainably manage forests
- Protect Forests from Harm
    - Objective: Identify, manage and reduce threats to forest and ecosystem health
- Enhance Public Benefits from Trees and Forests
    - Objective: Maintain and enhance the economic benefits and values of trees and forests
    - Objective: Protect, conserve, and enhance wildlife and fish habitat

Issue 4: Water Quality and Availability

There are three water supply sources, surface water, alluvial groundwater and bedrock groundwater. Forest management can most directly impact the surface water supply. The State of Oklahoma has more than 200 lakes and reservoirs, 167,600 miles of rivers and streams and roughly 55,646 miles of shoreline along lakes and ponds (Oklahoma Water Resource Board). The watersheds associated with many of these lakes and rivers are forested and provide clean water, excellent recreational opportunities, and habitat for many species of wildlife. Oklahoma forests produce the cleanest water of any land use, providing numerous public benefits, including absorbing rainfall, slowing and filtering runoff, reducing flooding, and recharging aquifers, yet the role of trees and forests in protecting water quality is not well recognized by the public. Therefore, maintaining and protecting forested watersheds, while important, is not considered by many landowners and citizens as high priority.

With Oklahoma's growing population comes a growing demand for water. Issues associated with Oklahoma's water resources are becoming more contentious as our citizens, as well as surrounding states, look for new sources and dependable supplies of clean water. Mitigating the impacts of human activities on water quality and quantity continues to be a point of concern.

Available clean water may become an increasing concern in the future. Oklahoma's forested watersheds are typically not managed for water supplies or may be converted to non-forested use resulting in lower quality and quantity of water produced. Urban growth leads to an increased presence of impermeable surfaces and unfiltered runoff. Less naturally filtered water leads to increased treatment costs and a greater need for water treatment infrastructure development.

Human activities can impact water quality and quantity through a variety of methods, resulting in pollution categorized as either point source or non-point source in nature. Some examples of human activities that can lead to point and non-point source pollution affecting our water resources are poultry litter runoff, improper septic systems, improper pesticide application, road construction, urban development, mineral extraction, excessive fertilization and oil and gas production sites.

Point source pollution is discharged from a traceable facility or source such as a pipe, ditch, factory, oil refinery, etc. Point source discharges from municipalities and various industries, though now effectively regulated in the state and nationwide, still pose a potential threat to Oklahoma's streams and rivers.

In contrast to point source pollution, non-point source pollution is not traceable to any discrete or identifiable facility or outlet. Non-point source pollution results from natural processes, including precipitation, seepage, percolation and runoff, and. This type of pollution is determined to a great extent by land use in a particular drainage basin and has become a major determinant of surface water quality in the state. Non-point source pollution can take on a number of forms in a forested watershed, such as:

> ***Sediment*** - Forest floor vegetation and organic debris protect the soil from the erosive action of falling raindrops and runoff. Removal of this protective layer, through deforestation, soil disturbance and land-use conversion can lead to erosion of the soil, creating sediment. In forestry, the largest contributors of sediment to stream systems are road construction and maintenance. When sediment is carried away in runoff and deposited elsewhere, sedimentation occurs. In the natural world, sedimentation is a slow, naturally occurring process. However, human activities often accelerate the process. The result can be large amounts of sediment accumulating in lakes, streams and wetlands that accelerate the aging of lakes and bury fish spawning grounds and aquatic plants. These plants are a source of food and habitat for fish and other aquatic organisms. Accumulating sediment also constricts naturally flowing channels, leading to increased stream bank erosion and possible flooding. Suspended sediment can cloud the water; adversely affecting the feeding potential of sight-feeding fish. It can also damage the gills of some fish species, causing them to suffocate.
>
> ***Organic Debris*** - Leaves and large woody debris (generally defined as large fallen logs, at least 12 inches in diameter with root ball attached) that naturally fall into streams can greatly benefit aquatic ecosystems. However, too much organic debris deposited in a short time can

harm water quality. Too much decomposing matter in streams can decrease dissolved oxygen in the water, which aquatic organisms need to thrive and reproduce.

Nutrients - Nutrients, such as nitrogen and phosphorus, exist naturally in forest soil and can enter water bodies if the soil erodes into water. Also, if fertilizers are used in forest management, they can wash into water bodies in runoff. Excessive amounts of nutrients may cause algal blooms in lakes and streams, which can reduce levels of dissolved oxygen in the water to below what fish and other aquatic species need to survive.

Temperature - Some sunlight filtering through trees is healthy for many streams. It can promote plant growth in the water and foster healthy ground vegetation along shorelines. However, when trees and the shade they provide are removed along small streams, peak mid-summer water temperatures climb as a result of increased solar radiation. This can reduce dissolved oxygen and affect the metabolism and development of fish and other aquatic organisms.

Chemicals - Pesticides (herbicides, insecticides and fungicides) help control pests and undesirable plant species. However, when applied improperly, pesticides can be toxic to aquatic life. In addition, fuel, oil and coolants used in equipment must be handled carefully to avoid soil contamination and water pollution.

Streamflow - Some timber harvesting and forest land conversion can increase peak streamflow which increases the likelihood of flooding, stream bank erosion and sedimentation. The use of heavy equipment can result in the compaction of large areas of the forest soil which leads to reduced water infiltration into the soil, thus increasing surface water runoff into streams. This also reduces water percolation and groundwater recharge. Groundwater provides cool, clean water to lakes and streams and maintains steady streamflows and lake levels throughout the year.

Forest fragmentation from land-use changes and development can also decrease water quality, as homes and impervious surfaces such as roads and parking lots replace woodland plants, wetlands, green space and soil that previously stored carbon dioxide, produced oxygen, absorbed pollutants and protected against erosion. Many riparian forest areas, especially in western and central Oklahoma, have been deforested to allow for more land for agricultural uses and urban development resulting in many forms of both point and non-point source pollution.

Another factor that is contributing to non-point source pollution is urban stormwater runoff. According to the Environmental Protection Agency, the 2004 *National Water Quality Inventory* reports that runoff from urban areas is the leading source of impairments to surveyed estuaries and the third largest source of water quality impairments to surveyed lakes. Cities install storm sewer systems that quickly channel this runoff from roads and other impervious surfaces. Runoff gathers speed once it enters the storm sewer system. When it leaves the system and empties into a stream, large volumes of quickly flowing runoff erode stream banks, damage streamside vegetation, and widen stream channels. In turn, this will result in lower water depths during non-storm periods, higher than normal water levels during wet weather periods, increased sediment loads, and higher water temperatures. Native fish and other aquatic life cannot survive in urban streams severely impacted by urban runoff. When runoff enters storm drains, it carries many of these pollutants with it. In older cities, this polluted runoff is often released directly into the water without any treatment. Increased pollutant loads can harm fish and wildlife populations, kill native vegetation, foul drinking water supplies, and make recreational areas unsafe.

The role forests play in cleaning and filtering Oklahoma's water is often overlooked or not understood. Many human activities are the leading cause for the loss of forests and the increase in the amount of contaminants in watersheds leading to the reduction in the quality of water supplies. This results in the increased risk of health issues in our state and also increases the cost of preparing water for human consumption and use.

A federal law that may affect land use and management practices is the Endangered Species Act. Regulations resulting from concerns regarding the management of threatened and endangered (T&E) species may also require that additional actions are taken to protect the water resource. The federal

Endangered Species Act prohibits harming protected species as well as the "taking" of protected species, including the destruction of habitats essential to their survival. There are several T&E species such as the Ozark cavefish, leopard darter, Neosho madtom and the Ouachita rock pocketbook mussel whose survival hinges on the quality of the water produced from Oklahoma's forests.

Federal and State laws, regulations and policies designed to eliminate or minimize pollution of the "waters of the U.S." deal with point sources and non-point sources separately. Most point sources are addressed by rules, regulations and permit authorities to prevent the release of a substance into a water body that could degrade its quality or impact a beneficial use of that water. On the other hand, NPS pollution, generally associated with land use practices, is addressed using best management practices (BMPs). BMPs lay out a framework of sound stewardship practices that help maintain a high degree of water quality. Although a few states have made BMPs mandatory, Oklahoma's approach to BMPs in agriculture, forestry and other NPS categories is non-regulatory in nature. The Oklahoma Forestry Code found in Oklahoma Statutes Title 2, Article 16, Section 16-3 mandates Oklahoma Forestry Services of the Oklahoma Department of Agriculture, Food, and Forestry to "administer silvicultural best management practices in cooperation with forestland users under the provisions of the state and federal water pollution laws…." Oklahoma Forestry Services' general approach to the development and implementation of BMPs is one of education, technical assistance and cooperation.

Timber harvesting, forest road construction and other practices may be viewed as being detrimental to water quality, despite our use of Forestry BMPs. There is a risk that local and state regulators may pursue greater controls over the practice of forestry and other land uses to address the perceived negative impacts. Protection of forest water quality is the responsibility of the landowner, the logger, the land manager, and all others applying practices or using the forest. Through sound and consistent application of Forestry BMP Guidelines, voluntary compliance monitoring and continuing educational efforts, it is hoped that Oklahoma can protect water quality and avoid a costly regulatory program that relies on permits and inspections.

Well-managed forests and healthy forest watersheds produce the highest water quality, and they can be manipulated to benefit stream flows and accommodate downstream users to some extent. Trees and forests reduce soil erosion, protect stream banks, filter pollutants, and reduce impacts of storm water runoff. Proper forest management, protecting streamside management zones and restoring riparian forests and planting trees to prevent erosion are critical elements of state efforts to protect water quality and availability.

Opportunities

Opportunities related to this issue include:

- Educate landowners, policy makers, natural resource professionals and forest industry on forests' contribution to the water resource and the protection of the water resource.
- Promote the conservation and proper management of the forest resource.

The Oklahoma Forest Resource Strategy discusses these opportunities and sets specific goals and objectives to address issues which link to these national priorities:

- Conserve Working Forests
    - Objective: Identify and conserve high priority forest ecosystems and landscapes
    - Objective: Actively and sustainably manage forests
- Protect Forests from Harm
    - Identify, manage, and reduce threats to forest and ecosystem health
- Enhance Public Benefits from Trees and Forests
    - Objective: Protect and enhance water quality and quantity.
    - Objective: Connect people to trees and forests, and engage them in environmental stewardship activities.

Issue 5: Community Forests Health and Care

A community forest includes the native and planted trees and wooded areas in and around developments, neighborhoods, communities, towns and cities. These forests also include green space and infrastructure, such as street trees, trees in city parks, trees along creeks, waterways and riparian corridors, and the individual trees that are all linked together.

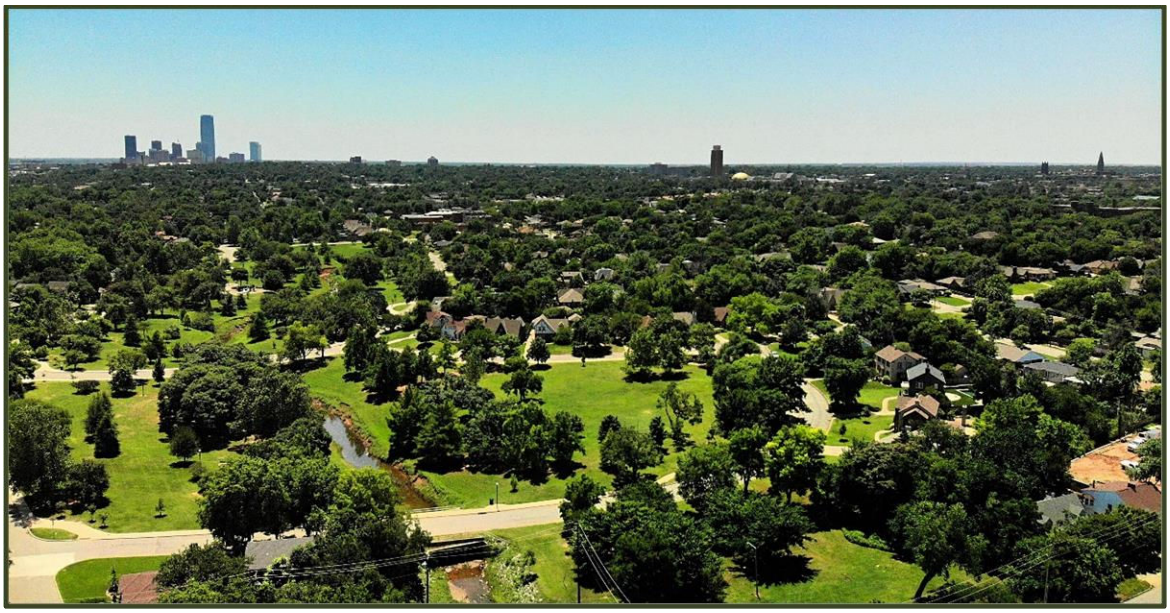


Figure 22: Community forest of Oklahoma City.

Our community forests provide many benefits to local residents as well as people who visit our state. The trees within the community forests clean the air and water, provide protection from the sun and wind, block noise, cut energy costs, provide habitat for community wildlife, conserve soil, slow storm water runoff, filter pollutants before reaching our waterways, improve the mental and physical health of people and can increase property value.

These are just a few of the reasons the trees in our community forests are so important to our way of life. Individual actions of our citizens within the communities can have a significant impact on the overall community forest ecosystem. To continue to enjoy the many benefits and services provided from our forests, it is extremely important that natural resource professionals and the citizens of Oklahoma work together to care for the health of the trees within our community forests as well as all forested landscapes across the state.

Oklahoma's community forests are threatened by numerous factors including, , urban expansion and population density, problem species and disease and insect outbreaks. It is critical to take a proactive management approach to addressing the needs of our community forests because the composition, health and overall condition of this forest impact the connected forests beyond traditional city boundaries.

There is a growing awareness by public and city officials regarding the valuable environmental services and human health benefits provided by community forests. The opportunity to utilize wood resources growing in and around communities for products other than firewood and mulch is gaining momentum.

Most people do not understand tree physiology and have little knowledge of or experience in natural resource issues, including tree care. This lack of awareness results in improper pruning, poor species selection, lawnmower blight, failure to match species to growing space and site conditions, improper planting techniques, failure to recognize hazardous trees, and interference with other elements of urban infrastructure, including power lines, water lines, sidewalks, streetlights, fences and neighbors

Community forestry information and education is not generating widespread support and advocacy at the local/municipal level needed to develop local proactive community forest management programs. According to the latest information from The Arbor Day Foundation, as of 2019 only 21 out of 597 incorporated communities in Oklahoma are recognized as a Tree City USA (*Figure 21*). Although these communities represent approximately 70 percent of the urban population and 45 percent of the State's population, improvement in the number of participating communities will extend the benefits of community forestry statewide.

2019 Tree City USA		
City	**Years**	**Population**
Ada	24	16,810
Bartlesville	36	35,750
Bixby	22	214,500
Broken Arrow	19	108,303
Claremore	34	20,000
Edmond	20	91,950
Enid	12	58,000
Guthrie	22	11,350
Jenks	1	22,578
Kingfisher	16	4,200
McAlester	31	18,044
Midwest City	37	57,000
Morrison	20	722
Muskogee	31	37,858
Nichols Hills	31	3,908
Norman	17	122,843
Oklahoma City	14	638,637
Pauls Valley	38	6,169
Ponca City	14	25,387
Shawnee	17	30,000
Tinker AFB	26	2,838
Tulsa	26	404,170
Vance AFB	26	2,474
Total Population		**1,933,491**

Figure 23: Oklahoma's Tree Cities USA.

Typically during land-use planning, policy making and zoning decisions, trees are not considered for their values and benefits to society, which often leads to the loss of important forests. It is important that communities consider green infrastructure when developing urban land-use plans. Green infrastructure is the network of open space, wildlife habitat, parks, and natural features that support healthy, functioning communities. When planning community infrastructure, the trees and forests, wildlife, waterways and other natural features should be considered in order to reduce impacts to the working ecosystem. Developing or protecting greenbelts and corridors can help conserve riparian areas and wildlife habitats. According to the American Forests, impervious surfaces continue to increase in urban areas across the United States. Storm water facilities are created to compensate for the tree loss but these facilities are expensive to build and maintain. Planting trees and conserving greenbelts and corridors is a much easier way to reduce storm water runoff and save money.

Many communities lack community forest management plans and/or do not have staff with the technical expertise to properly manage its forests as a whole. When any tree-related expertise is supported within a local government, it often focuses on individual tree care in parks and public places. This limits a community's ability to determine the overall condition and needs of the urban forest that would support the prioritization of funds and activities. A management plan would describe the benefits to the community from the urban forest, and the long-term goals the community hopes to achieve. A plan also includes an inventory of trees and forested areas within and adjacent to the community. An inventory would help determine the species composition, relative size, age, and overall health and condition of the trees within the community. It could provide structure for the management of the forest cover and prioritize issues needing to be addressed. It would also allow communities to assess any damage or loss of the community forest after a natural disaster.

Most of the forested areas surrounding Oklahoma City and Tulsa are within the Cross Timbers ecoregion. This forest type is often underappreciated because it is considered to have little or no economic or commercial value. Landowners in these areas typically do not keep the land forested unless they identify often overlooked benefits such as aesthetics, wildlife, water quality, etc. This has resulted in a history of urban wood resources being under-utilized.

Increasing urban expansion and the associated high population densities often reduces total urban forestlands and increases the difficulty of managing community forests. More people typically means a more diverse set of values and opinions, which can lead to difficulties developing a cohesive strategy for managing urban forest resources.

Oklahoma has an estimated 597 incorporated municipalities and whether the local governments in each of these communities realize it or not, they sustain and benefit from a community forest. According to the 2008 U.S. Census projections, approximately 65 percent of Oklahoma's population lives in an urban area. Since the first version of this document in 2010, Oklahoma's population has grown by 205,389 people from 3,751,582 to 3,956,971 as of the 2019 census. An increase of 5.5 percent at a rate just over 22,500 people each year.

As the population continues to increase, more and more people are moving into the wildland-urban interface, and what were once large tracts of forestlands are being fragmented and developed. The forests are being broken up and lost because of road construction, housing subdivisions, farms, businesses, or even small ranchettes. When the tracts are smaller and structures are intermixed within the forests, managing those lands becomes more complicated and the risks associated with wildfire increase.

In addition to communitywide goals, the objectives of individual homeowners and private landowners that mingle with public interests are often different depending on their personal values. This diversity of opinion can make it difficult to establish a cohesive strategy related to managing urban and community forests. As this ownership changes through time this could lead to land-use change. Land conversion from forest to other land uses impacts water quality, wildlife habitats, forest recreation opportunities and other related ecosystem services.

Oklahoma's community forests also face problems pertaining to certain species and the commonality of extreme weather events. These problems include the excessive and unwanted proliferation of certain species, storm damage and insects and disease.

Species selected for ornamental purposes can become problematic due to their ability to proliferate. Chinese privet, for example, is often planted as a hedge, but when unmanaged can expand into dense undesirable cover. Bradford pear has been very popular as a yard tree, but is prone to breakage and can have an unpleasant odor. It has become in some cases an invasive species on rural landscapes.

Most Oklahoman's are no stranger to the extreme and varied weather that we experience in this state. Ice and wind events are common occurrences that often result in heavy tree damage and damage to property. Many trees have been damaged within our communities because of natural disasters like wildfires, tornados, floods and ice storms occurring around the state. These are natural events that are not preventable but damage could be significantly reduced if communities prepared and managed the forests ahead of time. Weather damaged and weakened trees are more susceptible to insects and disease.

Insects and diseases can cause serious problems to trees around our communities. Common diseases include oak decline, needle blights, canker diseases, wilt diseases and Dutch elm disease. Common insects include defoliators, pinewood nematodes and the expected arrival of emerald ash borer.

Opportunities

There are numerous opportunities to improve and to address the health and care of Oklahoma's community forests. Education and planning are key components to maintaining and enhancing community forest ecosystems.

- Greater numbers of urban citizens moving into rural or wildland urban interface areas has created a larger more diverse audience for education programs related to forest sustainability and conservation.
- Increased opportunities for natural resource professionals to participate in community planning and policy making processes by use of tools such as green infrastructure and community wildfire protection plans.
- Promote the improved care of community forests through the use of forest management plans, staff with technical expertise, and encourage communities to become certified as Tree City USA.

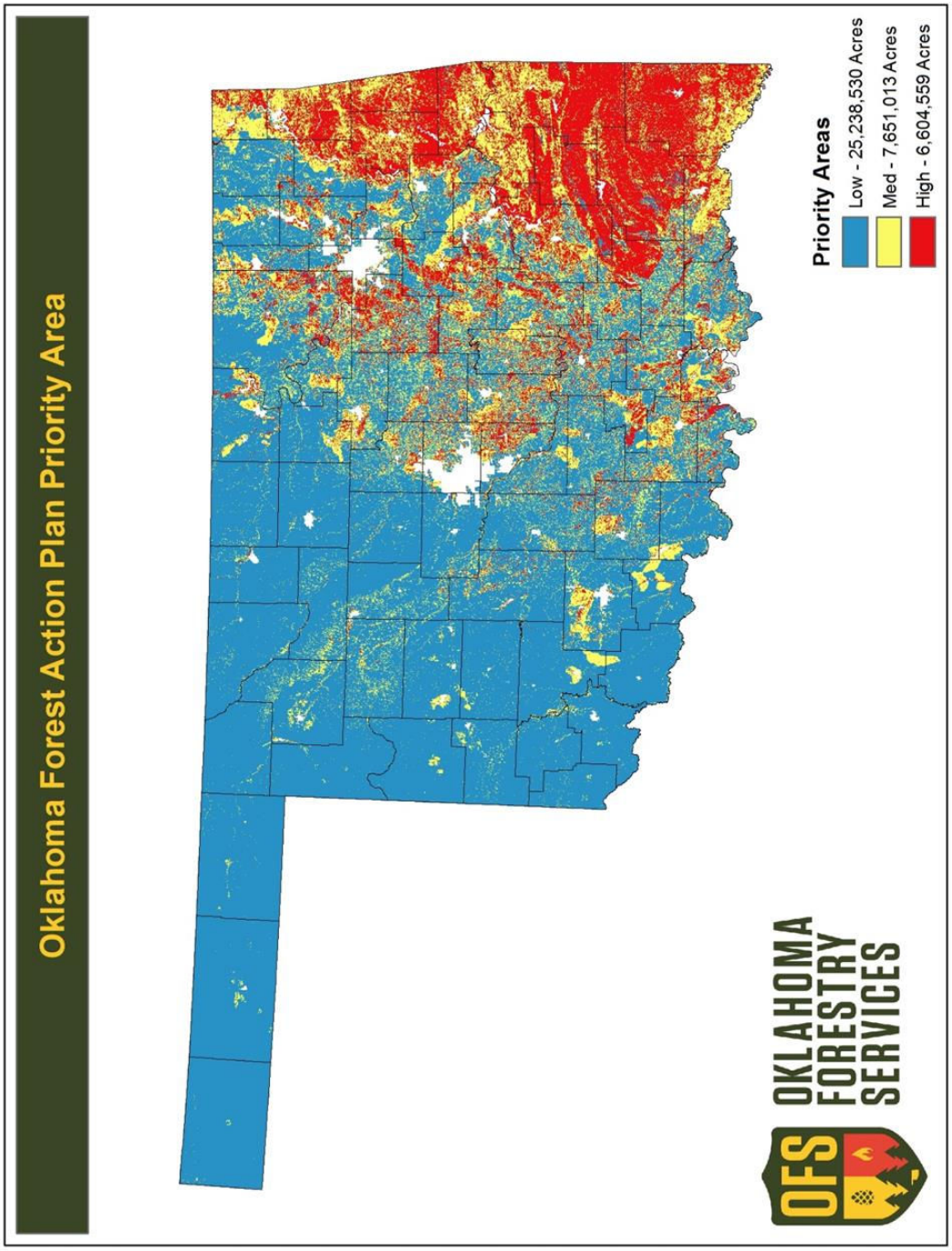
As more Oklahoma communities have CWPPs or are a certified Tree City USA, there is great opportunity to increase awareness of community forests benefits and values as well as plan for future generations.

The Oklahoma Forest Resource Strategy discusses these opportunities and sets specific goals and objectives to address issues which link to these national priorities:

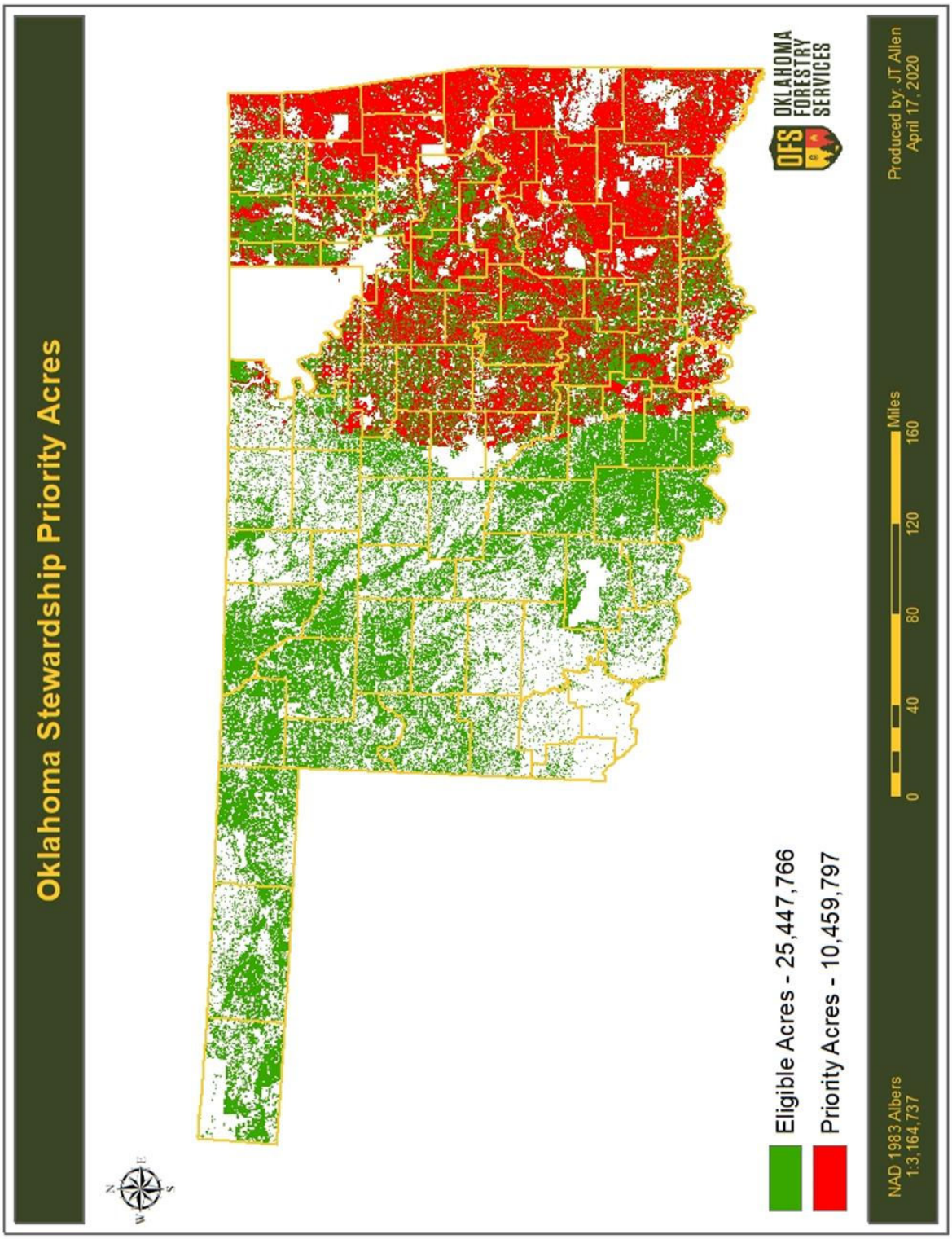
- Conserve Working Forests
    - Objective: Identify and conserve high priority forest ecosystems and landscapes
    - Objective: Actively and sustainably manage forests
- Protect Forest from Harm
    - Objective: Restore fire adapted lands and reduce wildfire risks (CWPPs)
    - Objective: Identify, manage, and reduce threats to forests and ecosystem health
- Enhance Public Benefits from Trees and Forests
    - Objective: Protect and enhance water quality
    - Objective: Improve air quality and conserve energy
    - Objective: Assist communities in planning for and reducing wildfire risk
    - Objective: Connect people to trees and forests, and engage them in environmental stewardship activities.

Oklahoma Priority Forestlands and Stewardship Potential Lands

The following maps illustrate the priority forestlands statewide and the potential for the state's Forest Stewardship Program. The Oklahoma Forest Action Plan Priority Area forestlands are the areas with the greatest importance to the State, based upon analysis of various issues, threats and opportunities associated with Oklahoma's forests.



The Stewardship Priority Acres Map depicts priority lands identified by the USDA Forest Service where Oklahoma Forestry Services should focus its federal funding to accomplish forest management projects. Both Areas are eligible to receive forest management assistance to accomplish the goal of increasing active conservation management in Oklahoma.



Forest Legacy Areas

Because Oklahoma's landscape is very diverse, there are many forest areas with unique features and special values that should be recognized and conserved, especially those that are being threatened by conversion to a non-forest use. In addition to various easement type programs currently operating in the state, the federal Forest Legacy Program offers Oklahoma an opportunity to compete for funding to help maintain and conserve these special places. Oklahoma Forestry Services, with the help of the public and other agencies and organizations (including The Nature Conservancy and Oklahoma Department of Wildlife Conservation), has identified forested areas with unique features or special values that should be conserved for future generations. These areas are called Forest Legacy Areas as shown on the map below and as described in this section.

Forest Legacy Program and Proposed Forest Legacy Areas

Oklahoma's Forest Action Plan encompasses all requirements for other forest related statewide plans. To satisfy the requirements for Forest Legacy defined in federal program guidelines, this section, plus information contained elsewhere in the Plan, serves as Oklahoma's Assessment of Need (AON). Additional guidelines and planning process materials can be found in Appendix B.

The Forest Legacy Program is typical of various programs designed to prevent forests and other lands with special values from conversion to other uses. These programs generally rely on long-term conservation easements negotiated between a land trust organization and a willing landowner. In Oklahoma, other entities already active in this area include The Nature Conservancy, Land Legacy, Inc., The Conservation Fund, Trust for Public Land, the Edmond Area Land Conservancy and the Norman Land Conservancy. The Healthy Forest Reserve Program, administered by the NRCS, offered a limited easement program in five counties of northeastern Oklahoma's karst topography to protect endangered bat species.

The Forest Legacy Program is administered by the USDA Forest Service in cooperation with State Foresters or another designated agency in each state. Forest Legacy funding may be used for easements or for fee simple purchases of forestlands that meet the program's criteria. However, federal funding is limited, competition is very great and there is a fairly complex process that must be followed. Legacy applications must be reviewed and prioritized by Oklahoma's Forest Stewardship Committee, approved by the Forest Service in the Southern Region and Washington, D.C., and have funding authorized by Congress. A required component of the program is for each state to designate Forest Legacy Areas, which are geographic areas that encompass unique forest habitats, ecosystems and values worthy of consideration. Only landowners within these approved areas are eligible to work with a land conservation organization and Forestry Services to submit a Legacy application.

For the purposes of this Plan, Forest Legacy Areas were selected from public and stakeholder input, while also considering other factors including the state's natural diversity, forest resources, ownership characteristics, forest threats and trends and current programs that influence the management of our forests. Each of these factors is discussed throughout this document. Some specific areas included in the identification of Forest Legacy Areas include The Nature Conservancy's conservation areas, the Probable Old-Growth Cross Timber Tracts, as well as unique or rare tree species and wildlife habitats identified by agency foresters and other stakeholders.

Forest Legacy Area (FLA) boundaries must encompass forestlands with significant environmental and other resource-based values. Areas may also include non-forested areas if they are an integral part of the landscape and are within the logical boundaries. Since FLA boundaries may not correspond to property boundaries, tracts located partially within the geographically defined FLA are eligible for Legacy, upon Forest Service approval of a boundary adjustment. To be eligible for Legacy, the proposed area must meet the following national criteria:

- Be an environmentally important forest area that is threatened by conversion to non-forest uses.
- Environmentally important forest areas shall contain one or more of the following important public values, as defined by the State:

        - Scenic resources
        - Public recreation opportunities
        - Riparian areas
        - Fish and wildlife habitat
        - Known threatened and endangered species
        - Known cultural resources
        - Other ecological values
    - Provide opportunities for the continuation of traditional forest uses, such as forest management, timber harvesting, other commodity use, and outdoor recreation. Forest Legacy is not a strict preservation program, but is intended to conserve working forestlands that offer outstanding public benefits.

Oklahoma Eligibility Criteria for Identification of Forest Legacy Areas

Oklahoma Forestry Services and interested stakeholders utilized the following criteria to help identify potential Forest Legacy Areas throughout the State:

1. Forested areas threatened by conversion to non-forest use, in both the near and long term;
2. Forest resources including:
    - Aesthetic and scenic values;
    - Fish and wildlife habitat, including threatened and endangered species;
    - Mineral resource potential;
    - Public recreation opportunities;
    - Soil productivity;
    - Timber management opportunities; and
    - Watershed values.
3. Historical use of forest areas, and trends and projected future uses of forest resources;
4. Current ownership patterns, size of tracts, trends and projected future ownership patterns;
5. Cultural resources that can be effectively protected;
6. Outstanding geological features;
7. Demographic trends as they relate to conversion of forest areas; and
8. Other ecological values.

The Forest Service, State or local government may only acquire lands and interests in lands identified within a Forest Legacy Area under the Forest Legacy Program authority on a willing seller/willing buyer basis.

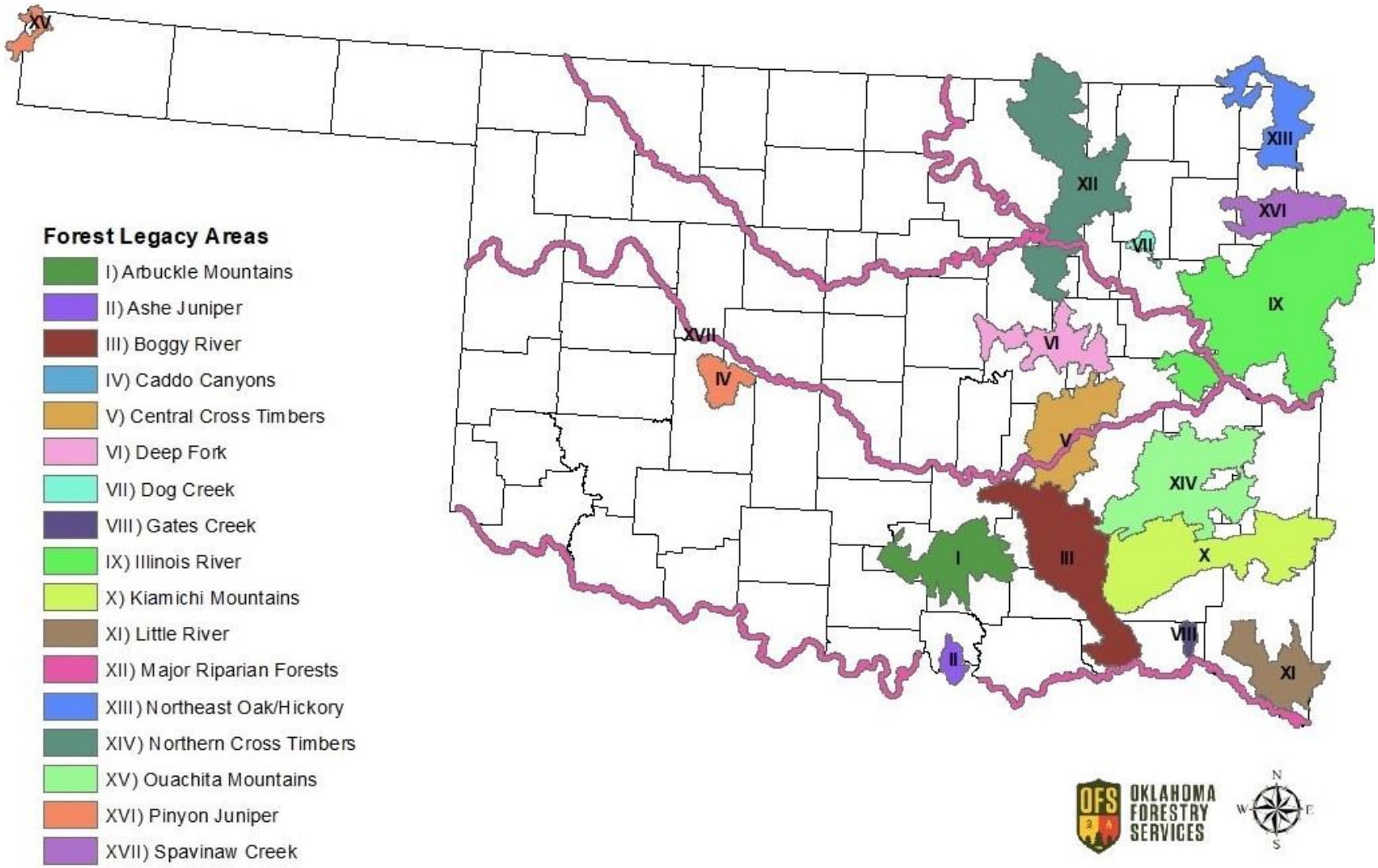
The Forest Legacy Program will help Oklahoma better conserve its natural resources. It will help enhance existing programs and opportunities and better coordinate non-government organizations with state agencies toward a common goal.

Objectives
Using the guidelines and input received from interested stakeholders, the following program objectives were determined in cooperation with the Forest Stewardship Committee:

1. Protect land adjacent to waterways and lakes or in sensitive watershed recharge areas.
2. Conserve highly productive soils and aid in soil stability thus protecting riparian habitat and water quality.
3. Maintain traditional forest uses, including retention of forestlands for timber production and preventing fragmentation, and providing connectivity between other conserved properties.
4. Maintain cultural and economic contributions to rural communities.
5. Protect land for wildlife and unique, threatened or endangered species.
6. Maintain scenic value.
7. Provide opportunities to the public for outdoor recreation.

Using the above guidelines, 17 Forest Legacy Areas (FLA) were established. These areas were determined with the help of Oklahoma Forestry Services employees and many interested

stakeholders including the Oklahoma Department of Wildlife Conservation and The Nature Conservancy. Oklahoma's proposed FLAs are illustrated on the map below and are described in the following section.


Forest Legacy Areas
I) Arbuckle Mountains
II) Ashe Juniper
III) Boggy River
IV) Caddo Canyons
V) Central Cross Timbers
VI) Deep Fork
VII) Dog Creek
VIII) Gates Creek
IX) Illinois River
X) Kiamichi Mountains
XI) Little River
XII) Major Riparian Forests
XIII) Northeast Oak/Hickory
XIV) Northern Cross Timbers
XV) Ouachita Mountains
XVI) Pinyon Juniper
XVII) Spavinaw Creek
XV
XIII
XII
XVI
VII
IX
XVII
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Forest Legacy Area (FLA) Descriptions

FLA: Northern Cross Timbers

Counties: Parts of the following counties are in the Northern Cross Timbers FLA: Creek, Nowata, Osage, Rogers, Tulsa and Washington.

Land Area and Ownership: The total land area of this forest legacy area is 1,074,625 acres. There are a few state and federally owned lands but the majority of this land is privately owned.

Description of Area: This area encompasses the northern-most largest remaining areas of intact Cross Timbers (post oak-blackjack oak forest type) in Oklahoma. Many of these large tracts are considered to contain 200 – 400 year old trees. Bottomland hardwood forests also exist in this area along the waterways including Caney River and Fish Creek. These upland oak forests and bottomland hardwood forests provide excellent habitat for many wildlife species including: White-tailed deer, wood duck, wintering waterfowl, river otter, wild turkey, bobcat, American woodcock, swamp rabbit, and northern bobwhite.

Threats to Area: The threats to this FLA include residential development, construction of power lines and water pipelines, dams, invasive/exotic species, and conversion of upland and bottomland hardwood forest to non-forest uses such as grazing lands and pastures, and loss of habitat. Wildlife species of concern in this FLA, according to Oklahoma Department of Wildlife Conservation, include: Swainson's Warbler, prothonotary warbler, rusty blackbird, alligator snapping turtle, rabbitsfoot mussel, Neosho mucket mussel, painted bunting, red-headed woodpecker, and regal fritillary.

Public Benefits: Recreation opportunities, scenic beauty, water quality values, fish and wildlife, historical values.

Parks and Recreation Areas: The Northern Cross Timbers Forest Legacy Area has several areas that provide recreational opportunities to the public. There are several state parks including, Osage Hills State Park and Wah Sha She State Park, which provide hiking trails, fishing and camping. There are also several wildlife management areas (WMA) including, Hulah WMA, John Dahl WMA, Osage WMA, and Candy WMA, which provide hunting and fishing opportunities. The federally owned Hulah Waterfowl Refuge attracts a variety of migratory birds.

Entities that may hold interests in lands of FLA: City of Sand Springs (Keystone Ancient Forest adjacent to Keystone Lake)

Input used to identify this FLA:

- Oklahoma Forestry Services
- The Nature Conservancy Conservation Areas - Elk Prairie Conservation Area
- Oklahoma Department of Wildlife Conservation Recommendation Areas – Bottomland hardwood forest on the lower Caney River and Upland Oak Forests and Woodlands in northeastern Osage County
- Remnant Cross Timbers Layer, David Stahle, University of Arkansas
- Oklahoma Biological Survey threatened and endangered species

Other States the FLA enters: Kansas

Goals for FLA:

The goals for the Northern Cross Timbers FLA are as follows:

- Protect lands adjacent to waterways and lakes to preserve water quality.
- Maintain cultural and economic contributions to rural communities.
- Protect habitat for wildlife and unique, threatened or endangered species.
- Maintain scenic value.
- Provide opportunities to the public for outdoor recreation.

FLA: Northeast Oak-Hickory

Counties: Parts of the following counties are in the Northeast Oak-Hickory FLA: Craig, Delaware and Ottawa.

Land Area and Ownership: The total land area of this forest legacy area is 244,713 acres. There are a few areas owned by the state and federal government but the majority of this land is privately owned with some tribal lands.

Description of Area: This area is comprised mostly of the oak-hickory forest type. The northeast part of this area encompasses a cave that has been occupied, at least historically by the endangered Ozark Cavefish. There is also forestland that has been occupied by the Cerulean Warbler, a rare songbird that has been documented in only six locations in Oklahoma. The southeast part of this area contains several large tracts of oak-hickory forest which lie over a karst formation that contains many caves and springs. One of the caves in the area supports a maternity colony of the federally endangered Gray Bat. Bottomland hardwood forests can also be found along the waterways including the Neosho River. The forests of this area provide wildlife with habitat including the following game species: white-tailed deer, wild turkey, American woodcock, wood duck, paddlefish, white bass, wintering waterfowl, and bobcat.

Threats to Area: Conversion of oak-hickory forest to non-forest uses such as pastures, loss of habitat, development (primarily retirement and secondary homes) and construction of power lines and water pipelines. Wildlife species of concern according to Oklahoma Department of Wildlife Conservation: Prothonotary warbler, rusty blackbird, alligator snapping turtle, trumpeter swan, Neosho mucket mussel, Western fanshell, elktoe mussel, Gray Bat, Arkansas darter, redspot chub, wedgespot shiner, Ozark minnow, cardinal shiner, stippled darter, Neosho crayfish, Oklahoma salamander, grotto salamander, cave salamander, Louisiana waterthrush, Kentucky warbler, worm-eating warbler, wood thrush, northern long-eared bat (listed by the U.S. Fish and Wildlife Service as a threatened species in April 2015 due to white-nose syndrome).

Public Benefits: Recreational opportunities, scenic beauty, water quality values, fish and wildlife habitat.

Parks and Recreation Areas: The Northeast Oak – Hickory Forest Legacy Area has two state parks, Twin Bridges State Park and Spring River State Park, which provide a variety of recreational opportunities in and around the oak-hickory forest type. There is camping, hiking trails, and water sport opportunities. Grand Lake, also in the area, provides similar recreational opportunities. There is the federally owned Ozark Plateau National Wildlife Refuge, in this area, that protects threatened and endangered bat habitat but currently it is not open to the general public for recreation opportunities.

Entities that may hold interests in lands of FLA: The Nature Conservancy and Land Legacy, Inc.

Input used to identify this FLA:

- Oklahoma Forestry Services
- Oklahoma Department of Wildlife Conservation Recommendation Areas – Northeast and Southeast Ottawa County and Bottomland Hardwood Forest along Neosho River near Miami
- Oklahoma Biological Survey threatened and endangered species

Other States the FLA enters: Kansas and Missouri

Goals for FLA:

The goals for the Northeast Oak-Hickory FLA are as follows:

- Protect lands adjacent to waterways and lakes.
- Conserve highly productive soils and aid in soil stability thus protecting riparian habitat and water quality.
- Maintain cultural and economic contributions to rural communities.
- Protect land for wildlife and unique, threatened and endangered species.
- Maintain scenic beauty.

- Provide outdoor recreation opportunities.

FLA: Illinois River

Counties: Parts of the following counties are in the Illinois River FLA: Adair, Cherokee, Delaware, Muskogee, McIntosh, Okmulgee, Sequoyah and Wagoner.

Land Area and Ownership: The total land area of this forest legacy area is 1,379,005 acres. There are some state parks, state wildlife management areas and a few federal properties but the majority of this land is privately owned with some tribal ownership.

Description of Area: The Illinois River Watershed is one of the State's most valuable and controversial watersheds. This area is comprised of oak-hickory, oak-pine and bottomland hardwood forest types. The Illinois River is located in the middle of this area and is a popular recreation area. Pollution in the river, tributaries and lakes has been a significant concern to the surrounding communities. The forestlands in this area are important to maintaining and enhancing the water quality of the area. Lake Tenkiller is the major water supply. This area also provides habitat to wildlife including these game species: white-tailed deer, American elk, wild turkey, American black bear, northern bobwhite, wood duck, wintering waterfowl, American woodcock and swamp rabbit.

Threats to Area: Conversion of oak-hickory, oak-pine, and bottomland hardwood forest to non-forest uses such as pastures and pine plantations, loss of habitat, residential development and pollution from poultry operations and streambank erosion. Wildlife species of concern according to Oklahoma Department of Wildlife Conservation: endangered Ozark big-eared bat, endangered gray bat, state-endangered long-nosed darter, black-sided darter, stippled darter, pallid shiner, cave salamander, Ozark salamander, ringed salamander, Louisiana waterthrush, cerulean warbler, hooded warbler, kentucky warbler, worm-eating warbler, wood thrush, and threatened northern long-eared bat, endangered American burying beetle, Swainson's warbler, prothonotary warbler, bald eagle, Oklahoma salamander, bluntface shiner, Ozark minnow, and wedgetail shiner, rusty blackbird, alligator snapping turtle, crawfish frog, pallid shiner, and Louisiana fatmucket.

Public Benefits: Recreational opportunities, scenic beauty, water quality values, fish and wildlife habitat, traditional timber products.

Parks and Recreation Areas: The Illinois River Forest Legacy Area provides excellent recreational opportunities to the public. There are eight state parks in the area that offer camping, hiking, water sports, and wildlife habitat. The state parks include Adair State Park, Brushy Lake State Park, Burnt Cabin Ridge State Park, Cherokee Landing State Park, Greenleaf State Park, Natural Falls State Park, Sequoyah Bay State Park and the Western Hills Guest Ranch/Sequoyah State Park Resort. There are also wildlife management areas, Cherokee-Gruber WMA, Cookson Hills WMA, Fort Gibson WMA, Lake Tenkiller State Park, McClellan-Kerr WMA, Tenkiller WMA, which provide hunting and fishing opportunities. Fort Gibson Lake and the Illinois River are also popular places to visit for recreation opportunities.

Entities that may hold interests in lands of FLA: The Nature Conservancy – Nickels Preserve, Land Legacy, Inc. in Spavinaw Creek, NRCS (through Healthy Forest Reserve Program and endangered bat project).

Input used to identify this FLA:

- Oklahoma Forestry Services
- The Nature Conservancy Conservation Areas - Cookson Hills, Dirty Creek, Fort Gibson, Cherokee-Gruber
- Oklahoma Department of Wildlife Conservation Recommendation Areas - Eastern Boston Mountains, Western Boston Mountains, Bottomland Hardwood Forest Along Dirty Creek
- Oklahoma Biological Survey threatened and endangered species

Other States the FLA enters: Arkansas

Goals for FLA:

The goals for the Illinois River FLA are as follows:

- Protect lands adjacent to waterways and lakes.
- Conserve highly productive soils and aid in soil stability thus protecting riparian habitat and water quality.
- Maintain traditional forest uses, including retention of forestlands for timber production and preventing fragmentation, and providing connectivity between other conserved properties.
- Maintain cultural and economic contributions to rural communities.
- Protect habitat for wildlife and unique, threatened or endangered species.
- Maintain scenic beauty.
- Provide outdoor recreation opportunities.

FLA: Spavinaw Creek

Counties: Parts of the following counties are in the Spavinaw Creek FLA: Delaware and Mayes.

Land Area and Ownership: The total land area of this forest legacy area is 216,907 acres. The majority of this land is privately owned with some tribal ownership.

Description of Area: This area is dominated by the oak-hickory forest type. It contains two important public water supply reservoirs. The area lies over a limestone karst formation that includes many caves and springs including two caves that serve as maternity sites for the endangered gray bat, and all of the known caves that support the state-endangered Oklahoma cave crayfish. In this area, there are game species including white-tailed deer, American elk, wild turkey, American woodcock and sport fish.

Threats to Area: Conversion of oak-hickory forest to non-forest uses such as croplands, pastures and pine plantations, loss of habitat, residential development and construction of power lines and water pipelines. Wildlife species of concern in this area, according to Oklahoma Department of Wildlife Conservation, include endangered gray bat, state-endangered Oklahoma cave crayfish, threatened Ozark cavefish, Arkansas darter, redspot chub, wedgespot shiner, Ozark minnow, cardinal shiner, stippled darter, Neosho crayfish, Oklahoma salamander, grotto salamander, cave salamander, Ozark salamander, Louisiana waterthrush, cerulean warbler, prothonotary warbler, Kentucky warbler, worm-eating warbler, wood thrush, threatened northern long-eared bat, and three species of Ozark endemic cave isopods and two species of Ozark endemic amphipods.

Public Benefits: Soil productivity, aesthetic and scenic values, fish and wildlife habitat, traditional timber products, recreation opportunities, cultural values.

Parks and Recreation Areas: The Spavinaw Creek Forest Legacy Area has some recreational opportunities for the public. There are two state parks, Lake Eucha State Park and Spavinaw State Park, which offer water sports, camping, scenic beauty and hiking. There is also a state owned Spavinaw WMA that provides hunting and fishing opportunities.

Entities that may hold interests in lands of FLA: The Nature Conservancy, Land Legacy, Inc. and NRCS (through the Healthy Forest Reserve Program).

Input used to identify this FLA:

- Oklahoma Forestry Services
- The Nature Conservancy Conservation Areas - Spavinaw Creek
- Oklahoma Department of Wildlife Conservation Recommendation Areas - Spavinaw Creek Watershed
- Oklahoma Biological Survey threatened and endangered species

Other States the FLA enters: Arkansas

Goals for FLA:

The goals for the Spavinaw Creek FLA are as follows:

- Protect lands adjacent to waterways and lakes.
- Conserve highly productive soils and aid in soil stability thus protecting riparian habitat and water quality.
- Protect habitat for wildlife and unique, threatened or endangered species.
- Maintain scenic beauty.
- Provide outdoor recreation opportunities.

FLA: Dog Creek

Counties: Parts of the following counties are in the Dog Creek FLA: Rogers and Wagoner.

Land Area and Ownership: The total land area of this forest legacy area is 39,422 acres. The majority of this land is privately owned but Army Corps of Engineers owns some of the land.

Description of Area: This area is dominated by the bottomland hardwood forest type. The Verdigris River flows through this area and a variety of large bottomland hardwoods can be found along the river and tributaries. The water quality in these waterways is important to fish and mussel populations. The forestlands in this area provide wildlife and the following game species with habitat: white-tailed deer, wood duck, wintering waterfowl, river otter, wild turkey, bobcat, American woodcock, swamp rabbit and multiple species of sport fish.

Threats to Area: Conversion of bottomland hardwood forest to non-forest uses such as pastures and pecan orchards, loss of habitat, residential development. Wildlife species of concern in this area, according to Oklahoma Department of Wildlife Conservation, include: Kentucky warbler, prothonotary warbler, rusty blackbird, alligator snapping turtle, crawfish frog, rabbitsfoot mussel, Neosho mucket mussel.

Public Benefits: Scenic beauty, public recreation opportunities and fish and wildlife habitat.

Parks and Recreation Areas: There are some recreational opportunities including fishing.

Entities that may hold interests in lands of FLA: None identified

Input used to identify this FLA:

- Oklahoma Forestry Services
- The Nature Conservancy Conservation Areas - Verdigris River and Horseshoe Lake
- Oklahoma Department of Wildlife Conservation Recommendation Areas - Bottomland Hardwood Forest along the Verdigris River near Dog Creek
- Remnant Cross Timbers, David Stahle, University of Arkansas
- Oklahoma Biological Survey threatened and endangered species

Other States the FLA enters: Arkansas

Goals for FLA:

The goals for the Dog Creek FLA are as follows:

- Protect lands adjacent to waterways to preserve water quality.
- Protect habitat for wildlife and unique, threatened or endangered species.
- Maintain scenic beauty.
- Provide outdoor recreation opportunities.

FLA: Central Cross Timbers

Counties: Parts of the following counties are in the Central Cross Timbers FLA: Hughes, McIntosh, Okfuskee, Okmulgee and Pittsburg.

Land Area and Ownership: The total land area of this forest legacy area is 567,043 acres. There are a few state owned lands but the majority of this land is privately owned.

Description of Area: This area is dominated by the post oak – blackjack oak forest type and contains some of the oldest trees found in the state. There are large tracts of post oak and blackjack oak ranging from 200 to 400 years old. The forest type is not the stereotypical ancient forest which often leads to the loss or degradation of these forests. Large tracts of ancient Cross Timbers can also be found around Lake Eufaula. In this area, there are game species including white-tailed deer, northern bobwhite, wild turkey and bobcat.

Threats to Area: Conversion of ancient post oak – blackjack oak forest to non-forest uses such as grazing lands or grasslands for livestock production, loss of habitat, residential development and construction of power lines and water pipelines. Wildlife species of concern according to Oklahoma Department of Wildlife Conservation: painted bunting, red-headed woodpecker, prothonotary warbler, Kentucky warbler, crawfish frog, and scarlet snake.

Public Benefits: Fish and wildlife habitat, public recreation opportunities, cultural values and water quality values.

Parks and Recreation Areas: There are no state parks in the Central Cross Timbers Forest Legacy Area but there are two wildlife management areas that provide hunting and fishing opportunities: Deep Fork WMA and Eufaula WMA.

Entities that may hold interests in lands of FLA: None identified

Input used to identify this FLA:

- Oklahoma Forestry Services
- The Nature Conservancy Conservation Areas – Parts of Coal County Woodlands, Deep Fork, Lake Eufaula Old Growth Cross Timbers, Lake Eufaula Tributaries, Canadian River (Cross Timbers)
- Oklahoma Department of Wildlife Conservation Recommendation Areas – Parts of Upland Oak Forests and Woodlands in eastern Hughes and western Pittsburg Counties and Upland Oak Forests and Woodlands in Northeastern McIntosh County
- Remnant Cross Timbers, David Stahle, University of Arkansas
- Oklahoma Biological Survey threatened and endangered species

Other States the FLA enters: None

Goals for FLA:

The goals for the Central Cross Timbers FLA are as follows:

- Protect lands adjacent to waterways and lakes to preserve water quality.
- Protect land for wildlife and unique, threatened and endangered species.
- Maintain scenic beauty.
- Maintain cultural and economic contributions to rural communities.
- Provide outdoor recreation opportunities.

FLA: Deep Fork

Counties: Parts of the following counties are in the Deep Fork FLA: Creek, Lincoln, McIntosh, Okfuskee and Okmulgee.

Land Area and Ownership: The total land area of this forest legacy area is 368,073 acres. There are a few state and federally owned lands but the majority of this land is privately owned.

Description of Area: This area is dominated by the bottomland hardwood and post oak – blackjack oak forest types. There are large hardwoods found along the Deep Fork River and its tributaries that provide water quality and fish and wildlife habitat. The following game species are found: white-tailed deer, wood duck, wintering waterfowl, wild turkey, bobcat, American woodcock and swamp rabbit.

Threats to Area: Conversion of bottomland hardwood and post oak – blackjack oak forest to non-forest uses such as grazing lands for livestock production, loss of habitat, residential development. Wildlife species of concern in this area, according to Oklahoma Department of Wildlife Conservation, include: Swainson's warbler, prothonotary warbler, Kentucky warbler, rusty blackbird, alligator snapping turtle and crawfish frog.

Public Benefits: Recreational opportunities, scenic beauty, water quality values, fish and wildlife habitat.

Parks and Recreation Areas: The Deep Fork Forest Legacy Area has several areas for recreational opportunities. There is one state park, Okmulgee/Dripping Springs State Park, which offers camping and fishing. There are also two state wildlife management areas, Deep Fork WMA, Okmulgee WMA, which provide hunting and fishing opportunities. There is also the federally owned Deep Fork National Wildlife Refuge in this area.

Entities that may hold interests in lands of FLA: None identified

Input used to identify this FLA:

- Oklahoma Forestry Services
- The Nature Conservancy Conservation Areas – Keystone Woodlands, Deep Fork, and Lake Eufaula Tributaries
- Oklahoma Department of Wildlife Conservation Recommendation Areas – Deep Fork River Bottomlands
- Remnant Cross Timbers, David Stahle, University of Arkansas
- Oklahoma Biological Survey threatened and endangered species

Other States the FLA enters: None

Goals for FLA:

The goals for the Deep Fork FLA are as follows:

- Protect lands adjacent to waterways.
- Conserve highly productive soils and aid in soil stability thus protecting riparian habitat and water quality.
- Protect land for wildlife and unique, threatened and endangered species.
- Maintain scenic beauty.
- Provide outdoor recreation opportunities.

FLA: Boggy River

Counties: Parts of the following counties are in the FLA: Atoka, Choctaw, Coal, Hughes, Pittsburg, Pontotoc and Pushmataha.

Land Area and Ownership: The total land area of this forest legacy area is 918,474 acres. The majority of this land is privately owned.

Description of Area: This area is dominated by bottomland hardwood forest type but also contains oak – pine and post oak – blackjack oak forest types. There are some ancient post oak – blackjack

oak forest tracts that can be found in this area. There are also large hardwoods, including bur oak and pecan, found along the rivers and tributaries. The Clear Boggy and Muddy Boggy Rivers flow through this area and provide water quality, recreation, and fish and wildlife habitat. In this area, there are game species including wood duck, white-tailed deer, river otter, swamp rabbit and several species of wintering waterfowl (e.g. mallard, green-winged teal, ring-necked duck).

Threats to Area: Conversion of bottomland hardwood and post oak – blackjack oak forest to non-forest uses such as pastures, loss of habitat, residential development. Wildlife species of concern according to Oklahoma Department of Wildlife Conservation: prothonotary warbler, wood stork, rusty blackbird, alligator snapping turtle, razor-backed musk turtle, Kentucky warbler, crawfish frog, rocky shiner, blue sucker, and Ouachita kidneyshell.

Public Benefits: Recreational opportunities, scenic beauty, water quality values, fish and wildlife habitat and soil productivity.

Parks and Recreation Areas: The Boggy Creek Forest Legacy Area provides several recreational opportunities to the public. The McGee Creek Natural Scenic Recreation Area and the McGee Creek State Park offer multiple outdoor recreation activities. There are also three wildlife management areas, Atoka WMA, McGee Creek WMA and Stringtown WMA, which provide hunting and fishing opportunities.

Entities that may hold interests in lands of FLA: None identified

Input used to identify this FLA:

- Oklahoma Forestry Services
- The Nature Conservancy – Parts of McAlester, Pipewort Haven, Boggy Seeps, Coal County Woodlands, Lake Eufaula Old Growth Cross Timbers, Red River East of Lake Texoma
- Oklahoma Department of Wildlife Conservation Recommendation Areas – Clear Boggy and Muddy Boggy River Bottomland Hardwood Forests
- Remnant Cross Timbers, David Stahle, University of Arkansas
- Oklahoma Biological Survey threatened and endangered species

Other States the FLA enters: None

Goals for FLA:

The goals for the Boggy FLA are as follows:

- Protect lands adjacent to waterways to preserve water quality.
- Conserve highly productive soils and aid in soil stability thus protecting riparian habitat and water quality.
- Protect habitat for wildlife and unique, threatened or endangered species.
- Maintain scenic beauty
- Provide outdoor recreation opportunities

FLA: Kiamichi Mountains

Counties: Parts of the following counties are in the Kiamichi Mountains FLA: Atoka, Latimer, LeFlore, McCurtain, Pittsburg and Pushmataha.

Land Area and Ownership: The total land area of this forest legacy area is 1,013,328 acres. The majority of this land is privately owned.

Description of Area: This area is dominated by the oak – pine forest type but shortleaf and loblolly pine and oak – hickory forest types can be found. Most of this area is adjacent to the Ouachita National Forest and is privately owned which is at risk to conversion to non-forest uses. There are areas where large older shortleaf pine can be found. In this area, there are game species including eastern wild turkey, white-tailed deer, river otter, bobcat, black bear and northern bobwhite.

Threats to Area: Conversion of oak – pine forest to non-forest uses such as pastures, loblolly pine plantations, loss of habitat, residential development. Wildlife species of concern according to Oklahoma Department of Wildlife Conservation: Bachman's sparrow, worm-eating warbler, Ouachita dusky salamander, threatened northern long-eared bat, Kentucky warbler, brown-headed nuthatch, prairie Warbler, Ouachita rock pocketbook, Ouachita kidneyshell, cerulean warbler, hooded warbler, wood thrush, rich mountain salamander, southern red-backed salamander, Kiamichi slimy salamander, Louisiana waterthrush, ringed salamander, southeastern bat, spotted skunk, Kiamichi river shiner, Kiamichi crayfish, leopard darter, Ouachita mountain shiner, rocky shiner, peppered shiner, Mena crayfish.

Public Benefits: Recreational opportunities, scenic beauty, water quality values, fish and wildlife habitat, soil productivity and traditional timber products.

Parks and Recreation Areas: There are several state owned lands in the Kiamichi Mountain Forest Legacy Area which provide recreational opportunities. The Clayton State Park, Gary Sherrer WMA and Pushmataha WMA all offer public recreation. In this area, there are also several federally owned lands such as Winding Stairs National Recreation Area, Ouachita WMA, Black Fork Mountain Wilderness, Robert S. Kerr Memorial Arboretum and Botanical Area, Upper Kiamichi River Wilderness, and Ouachita National Forest.

Entities that may hold interests in lands of FLA: The Nature Conservancy and The Conservation Fund

Input used to identify this FLA:

- Oklahoma Forestry Services
- The Nature Conservancy Conservation Areas – Beavers Bend Hills, Pushmataha WMA, Rich Mountain, Pipewort Haven
- Oklahoma Department of Wildlife Conservation Recommendation Areas – Central Ouachita Mountains, Forestland surrounding Pushmataha WMA, and John's Valley
- Remnant Cross Timbers, David Stahle, University of Arkansas
- Oklahoma Biological Survey threatened and endangered species

Other States the FLA enters: Arkansas

Goals for FLA:

The goals for the Kiamichi Mountains FLA are as follows:

- Protect lands adjacent to waterways and lakes.
- Conserve highly productive soils and aid in soil stability thus protecting riparian habitat and water quality.
- Maintain traditional forest uses, including retention of forestlands for timber production and preventing fragmentation, and providing connectivity between other conserved properties.
- Protect habitat for wildlife and unique, threatened or endangered species.
- Maintain cultural and economic contributions to rural communities.
- Maintain scenic beauty.
- Provide outdoor recreation opportunities.

FLA: Ouachita Mountains

Counties: Parts of the following counties are in the FLA: Haskell, Latimer, LeFlore, Pittsburg and Pushmataha.

Land Area and Ownership: The total land area of this forest legacy area is 926,482 acres. The majority of this land is privately owned.

Description of Area: This area is dominated by the oak-pine, oak-hickory and post oak – blackjack oak forest types. This area is a transition zone from the oak – pine forests to the oak – hickory and post oak – blackjack oak forest types. There are a few areas where some remnant Cross Timber tracts

can be found. In this area, there are game species including eastern wild turkey, white-tailed deer and black bear, northern bobwhite, and American elk, wood duck, wintering waterfowl, river otter, bobcat, American woodcock, swamp rabbit.

Threats to Area: Conversion of oak – pine and oak – hickory forest to non-forest uses such as grazing lands and pastures, loblolly pine plantations, loss of habitat, residential development and construction of power lines. Wildlife species of concern according to Oklahoma Department of Wildlife Conservation: Swainson's warbler, hooded warbler, prothonotary warbler, rusty blackbird, alligator snapping turtle, crawfish frog, pallid shiner, southern hickorynut mussel and Louisiana fatmucket, Kentucky warbler, Louisiana waterthrush, brown-headed nuthatch, and prairie warbler, Ouachita dusky, many-ribbed salamander, threatened northern long-eared bat, worm-eating warbler, rich mountain salamander, and spotted skunk

Public Benefits: Recreational opportunities, scenic beauty, water quality values, fish and wildlife habitat, traditional timber products and soil productivity.

Parks and Recreation Areas: The Ouachita Mountains Forest Legacy Area has an abundance of recreational opportunities on the following lands: Eufaula WMA, Gary Sherrer WMA, James Collins WMA, Robbers Cave State Resort Park, Robbers Cave WMA, Talimena State Park, Wister WMA and Yourman WMA. The federal government owns the Ouachita National Forest, Winding Stair Mountain NRA and Ouachita WMA which provide hiking trails, horseback riding, scenic beauty, camping, and other outdoor activities. The Talimena Scenic Byway traverses the Winding Stairs National Recreation Area and is a popular drive to observe beautiful fall foliage.

Entities that may hold interests in lands of FLA: The Conservation Fund

Input used to identify this FLA:

- Oklahoma Forestry Services
- The Nature Conservancy Conservation Areas – Parts of Rich Mountain, Arkansas River Valley Prairies, Lake Eufaula Tributaries
- Oklahoma Department of Wildlife Conservation Recommendation Areas – Western Winding Stair Mountain Ridge, San Bois Mountains, Bottomland Hardwood Forest on Gaines Creek
- Remnant Cross Timbers, David Stahle, University of Arkansas
- Oklahoma Biological Survey threatened and endangered species

Other States the FLA enters: None

Goals for FLA:

The goals for the Ouachita Mountains FLA are as follows:

- Protect lands adjacent to waterways and lakes.
- Conserve highly productive soils and aid in soil stability thus protecting riparian habitat and water quality.
- Maintain traditional forest uses, including retention of forestlands for timber production and preventing fragmentation, and providing connectivity between other conserved properties.
- Protect habitat for wildlife and unique, threatened or endangered species.
- Maintain cultural and economic contributions to rural communities.
- Maintain scenic beauty.
- Provide outdoor recreation opportunities.

FLA: Southeast Rivers

Counties: Parts of the following county is in the FLA: McCurtain

Land Area and Ownership: The total land area of this forest legacy area is 394,291 acres. The majority of this land is privately owned but there are a few federal lands.

Description of Area: This area is dominated by the bottomland hardwood forest type but loblolly pine and oak – pine forests can be found. In this area, some beautiful large bald cypress can be found in and around the river and tributaries. The rivers in this area include the Little River and Glover River which are popular recreation areas. An estimated 25 to 30 threatened and endangered plant and animal species occur along the Little River including the American Alligator. The Glover River is a tributary of the Little River and considered critical habitat for the threatened leopard darter. In this area, there are also game species including white-tailed deer, wood duck, wintering waterfowl, wild turkey, bobcat, American woodcock and swamp rabbit.

Threats to Area: Conversion of bottomland hardwood, pine and oak – pine forest to non-forest uses such as grazing lands for livestock production, loss of habitat for threatened and endangered species, residential development and southern pine beetle. Wildlife species of concern according to Oklahoma Department of Wildlife Conservation: Swainson's warbler, hooded warbler, Kentucky warbler, wood thrush, prothonotary warbler, rusty blackbird, alligator snapping turtle, razor-backed musk turtle, western mudsnake, Louisiana milksnake, three-toed amphiuma, lesser siren, Sequoyah slimy salamander, crawfish frog, blackspot shiner, Creole darter, Harlequin darter, goldstripe darter, taillight shiner, American burying beetle, Blair's swamp crayfish.

Public Benefits: Recreational opportunities, scenery, water quality values, fish and wildlife habitat.

Parks and Recreation Areas: There are no state lands in the Southeast Rivers Forest Legacy Area but a few federal lands exist. The Little River National Wildlife Refuge and Ouachita WMA Tiak and McCurtain Unit provide wildlife observation and some hunting and fishing opportunities. The Glover River is a popular recreation area in McCurtain County and is an area that has been discussed for conservation, protection and possibly scenic river designation.

Entities with interests in lands of FLA: The Conservation Fund and The Nature Conservancy

Input used to identify this FLA:

- Oklahoma Forestry Services
- The Nature Conservancy – Parts of Beavers Bend Hills, Little River, McCurtain County, and Weyerhaeuser Tiak
- Oklahoma Department of Wildlife Conservation Recommendation Areas – Watersheds of McKinney Creek and North Caney Creek
- Oklahoma Biological Survey threatened and endangered species

Other States the FLA enters: Arkansas

Goals for FLA:
The goals for the Southeast Rivers FLA are as follows:

- Protect lands adjacent to waterways and lakes.
- Conserve highly productive soils and aid in soil stability thus protecting riparian habitat and water quality.
- Maintain traditional forest uses, including retention of forestlands for timber production and preventing fragmentation, and providing connectivity between other conserved properties.
- Protect habitat for wildlife and unique, threatened or endangered species.
- Maintain cultural and economic contributions to rural communities.
- Maintain scenic beauty.
- Provide outdoor recreation opportunities.

FLA: Gates Creek

Counties: Parts of the following county is in the FLA: Choctaw.

Land Area and Ownership: The total land area of this forest legacy area is 38,998 acres. The majority of this land is privately owned.

Description of Area: This area is dominated by the bottomland hardwood forest type. This is one of the Red River tributaries that is still predominately forested. In this area, there are game species including white-tailed deer, wood duck, wild turkey, bobcat, American woodcock and swamp rabbit.

Threats to Area: Conversion of bottomland hardwood and oak – pine forest to non-forest uses such as pastures, loss of habitat, residential development, and conversion to loblolly pine plantations. Wildlife species of concern according to Oklahoma Department of Wildlife Conservation: Kentucky warbler, hooded warbler, prothonotary warbler, rusty blackbird, crawfish frog, goldstripe darter, crystal darter, blackspot shiner, Kiamichi shiner and southern hickorynut mussel.

Public Benefits: Recreational opportunities, scenic beauty, water quality values, fish and wildlife habitat, soil productivity, traditional timber products.

Parks and Recreation Areas: There is one state park, Raymond Gary State Park, in the Gates Creek Forest Legacy Area which provides some hunting and fishing opportunities.

Entities that may hold interests in lands of FLA: None identified

Input used to identify this FLA:

- Oklahoma Forestry Services
- The Nature Conservancy – Meadow Rue Seep Area 1 and 2
- Oklahoma Department of Wildlife Conservation Recommendation Areas – Gates Creek
- Remnant Cross Timbers Layer, David Stahle, University of Arkansas
- Oklahoma Biological Survey threatened and endangered species

Other States the FLA enters: Arkansas

Goals for FLA:

The goals for the Gates Creek FLA are as follows:

- Protect lands adjacent to waterways and lakes.
- Conserve highly productive soils and aid in soil stability thus protecting riparian habitat and water quality.
- Maintain traditional forest uses, including retention of forestlands for timber production and preventing fragmentation, and providing connectivity between other conserved properties.
- Protect habitat for wildlife and unique, threatened or endangered species.
- Maintain scenic beauty.
- Provide outdoor recreation opportunities.

FLA: Major Riparian Forests

Counties: Parts of the following counties are in the FLA: Blaine, Bryan, Canadian, Choctaw, Cleveland, Cotton, Creek, Dewey, Ellis, Grady, Harmon, Haskell, Hughes, Jackson, Jefferson, Kay, Kingfisher, Logan, LeFlore, Lincoln, Love, Major, Marshall, McClain, McIntosh, McCurtain, Muskogee, Osage, Payne, Pittsburg, Pontotoc, Roger Mills, Seminole, Sequoyah, Tillman, Tulsa, Wagoner, Woods and Woodward.

Land Area and Ownership: The total land area of this forest legacy area is 1,652,489 acres. The majority of this land is privately owned.

Description of Area: This area is dominated by the bottomland hardwood forest type. The major riparian forests grow along the Red, Cimarron, Arkansas, and Canadian Rivers as well as their tributaries. The hardwood species found along the rivers in west Oklahoma are significantly different than the species found in east Oklahoma. Western riparian forests have been drastically degraded over the years from lands being converted to croplands and pastures. Willows, oaks, and cottonwoods are typically species that can be found in western riparian forests. As you move toward central Oklahoma riparian forests the number of trees and species increase. In central riparian forests, there are typically elms, willows, cottonwoods, sycamores, pecans, and walnuts. The eastern riparian forests are the most diverse and where ashes, elms, sweetgums, maples, pecans, oaks, walnuts, boxelders and other moist site species can be found. The riparian forests are important to keeping ecosystems healthy and providing quality water to our state. There are a wide variety of wildlife and fish species that depend on these waterways to survive.

Threats to Area: Conversion of bottomland hardwood forest to non-forest uses such as development, pastures and grazing land for livestock, salt cedar invasion, loss of habitat, erosion, water quality and construction of power lines and water pipelines.

Public Benefits: Recreational opportunities, scenic beauty, water quality values, fish and wildlife habitat.

Parks and Recreation Areas: The Major Riparian Forests Forest Legacy Area provides an abundance of recreational opportunities to the state. There are numerous state parks and wildlife management areas in and around these riparian forests including Feyodi Creek State Park, Keystone Lake and State Park, Little Sahara State Park, Oliver Wildlife Preserve, Walnut Creek State Park, Greenleaf State Park, Eufaula WMA, Cherokee-Gruber WMA, Kaw WMA, Keystone WMA, Lone Valley WMA, McClellan-Kerr WMA and Packsaddle WMA. These areas are enjoyed by many for the variety of outdoor activities offered.

Entities that may hold interests in lands of FLA: None identified

Input used to identify this FLA:

- Oklahoma Forestry Services
- The Nature Conservancy – Cimarron River, Canadian River, Red River Floodplain, Cimarron River Floodplain, Canadian River (Cross Timbers), Pecan Bayou
- Oklahoma Biological Survey threatened and endangered species

Other States the FLA enters: Texas, Kansas and Arkansas

Goals for FLA:

The goals for the Major Riparian Forests FLA are as follows:

- Protect lands adjacent to waterways to preserve water quality.
- Protect habitat for wildlife.
- Maintain scenic beauty.
- Provide outdoor recreation opportunities.

FLA: Arbuckle Mountains

Counties: Parts of the following counties are in the FLA: Carter, Coal, Johnston, Murray and Pontotoc.

Land Area and Ownership: The total land area of this forest legacy area is 511,026 acres. The majority of this land is privately owned.

Description of Area: This area is dominated by the post oak – blackjack oak forest type. Some ancient Cross Timber tracts can be found in this area in the rocky rolling hills.

Threats to Area: Conversion of post oak – blackjack oak forest to non-forest uses such as croplands and pastures, loss of habitat, residential development, construction of power lines and water pipelines.

Public Benefits: Recreational opportunities, scenic beauty, water quality values, fish and wildlife habitat.

Parks and Recreation Areas: The Arbuckle Mountains Forest Legacy Area has several public recreation areas such as the Blue River Public fishing and hunting area, Turner Falls and Texoma/Washita Arm/Tishomingo WMA. These areas provide camping, fishing, swimming, and hiking opportunities. There are also the federally owned Chickasaw National Recreation Area and Tishomingo National Wildlife Refuge which provide wildlife observation and some hunting opportunities

Entities that may hold interests in lands of FLA: None identified

Input used to identify this FLA:

- Oklahoma Forestry Services – Arbuckle Aquifer
- The Nature Conservancy Conservation Areas – Parts of Arbuckle Mountains and Arbuckle Plains
- Remnant Cross Timbers Layer, David Stahle, University of Arkansas
- Oklahoma Biological Survey threatened and endangered species
- SAF Natural Area – Seaside Alder along Pennington Creek

Other States the FLA enters: None

Goals for FLA:

The goals for the Arbuckle Mountains FLA are as follows:

- Protect lands adjacent to waterways to preserve water quality.
- Protect habitat for wildlife.
- Maintain scenic beauty.
- Provide outdoor recreation opportunities.

FLA: Caddo Canyons

Counties: Parts of the following counties are in the FLA: Caddo and Canadian

Land Area and Ownership: The total land area of this forest legacy area is 153,309 acres. The majority of this land is privately owned.

Description of Area: This area is dominated by the bottomland hardwood forest type. Isolated canyons along Sugar Creek support relict stands of sugar maple, locally known as Caddo Maple. There are also a variety of other hardwoods that can be found in this area such as post oak, blackjack oak, bur oak and black walnut. This area is unique to the state because it is the only area where these stands occur.

Threats to Area: This area has been heavily impacted by agriculture. Cotton, wheat, grain sorghum, peanuts, and other row crops were once grown across much of Caddo and Canadian Counties. There is evidence of severe soil erosion across this area. Oil and gas development, residential development, and other infrastructure threaten this area and forests could be lost to non-forest uses.

Public Benefits: Recreational opportunities, scenic beauty, water quality values, fish and wildlife habitat.

Parks and Recreation Areas: Red Rock Canyon State Park is found within this area which offers a variety of recreational opportunities such as camping, fishing, hiking, and rappelling.

Entities that may hold interests in lands of FLA: None identified

Input used to identify this FLA:

- Oklahoma Forestry Services
- The Nature Conservancy – Parts of Caddo Canyons
- Oklahoma Biological Survey threatened and endangered species

Other States the FLA enters: None

Goals for FLA:

The goals for the Caddo Canyons FLA are as follows:

- Protect lands adjacent to waterways and lakes to preserve water quality.
- Protect habitat for wildlife.
- Maintain scenic beauty.
- Provide outdoor recreation opportunities.

FLA: Pinyon – Juniper

Counties: Parts of the following county is in the FLA: Cimarron

Land Area and Ownership: The total land area of this forest legacy area is 44,726 acres. There is one state park in this area but the majority of this land is privately owned.

Description of Area: This area is dominated by the pinyon pine – juniper forest type. These are more often woodlands because the trees are no taller than 20 feet and the crowns typically do not touch. There are small stands of ponderosa pine scattered throughout this area which is unique because this is the single native area for this species in the state. This is a very arid area and very little vegetation grows across this landscape and this is the only area in the panhandle where native trees can be found.

Threats to Area: Conversion of pinyon pine – juniper forest to non-forest uses such as grazing land and pastures for livestock production.

Public Benefits: Recreational opportunities, scenic beauty, wildlife habitat.

Parks and Recreation Areas: The Black Mesa State Park Reserve provides some excellent overlooks as well as some camping and trail opportunities.

Entities that may hold interests in lands of FLA:

Input used to identify this FLA:

- Oklahoma Forestry Services
- Society of American Foresters – Natural Area
- Oklahoma Biological Survey threatened and endangered species

Other States the FLA enters: Colorado and New Mexico

Goals for FLA:

The goals for the Pinyon – Juniper FLA are as follows:

- Protect habitat for wildlife.
- Maintain scenic beauty and cultural value.
- Provide outdoor recreation opportunities.

FLA: Ashe Juniper

Counties: Parts of the following county is in the FLA: Marshall.

Land Area and Ownership: The total land area of this forest legacy area is 59,536 acres. The majority of this land is privately owned.

Description of Area: This area is dominated by the post oak – blackjack oak forest type but is one of the only areas Ashe juniper can be found in the state.

Threats to Area: Conversion of post oak – blackjack oak forest to non-forest uses such as croplands and pastures, loss of habitat, residential development.

Public Benefits: Recreational opportunities, scenic beauty, water quality values, fish and wildlife habitat.

Parks and Recreation Areas: There are some recreational opportunities along the Red River and near Lake Texoma.

Entities that may hold interests in lands of FLA: None identified

Input used to identify this FLA:

- Oklahoma Forestry Services
- Remnant Cross Timbers, David Stahle, University of Arkansas
- Oklahoma Biological Survey threatened and endangered species

Other States the FLA enters: None

Goals for FLA:
The goals for the FLA are as follows:

- Protect lands adjacent to waterways to preserve water quality.
- Protect habitat for wildlife.
- Maintain scenic beauty and cultural value.
- Provide outdoor recreation opportunities.

Project Evaluation and Prioritization Procedures

In implementing these Forest Legacy objectives, the following actions will be pursued in order to address the primary threats to the state's forestlands and resources:

*In **protecting lands adjacent to waterways and lakes or in sensitive watershed recharge areas,** priority will be given to:*

- Tracts that contain riparian habitat.
- Tracts owned by landowners who will encourage regeneration of healthy stands of native species.
- Tracts owned by landowners who will identify and protect sensitive riparian habitat and who will seek to minimize non-point sources of pollution.
- Tracts that drain directly into streams, lakes or aquifers, especially drinking water sources.

*In **protecting and conserving highly productive soils, aiding in soil stability and protecting water quality,** priority will be given to:*

- Tracts that contain highly productive soils.
- Tracts that contain soils that are highly erodible.
- Tracts that produce high levels of sediment and runoff into streams, rivers, and lakes that is preventable with treatment.
- Tracts owned by landowners that will actively manage in accordance to forest water quality Best Management Practice Guidelines.

*In **maintaining traditional forest uses, including retaining forest land for timber production and preventing fragmentation***, and providing connectivity between other conserved properties***,** *priority will be given to*:

- Tracts owned by landowners that will actively manage for forest health.
- Tracts of sufficient size and site quality to produce volumes of wood products that help satisfy timber demands, provide income, and make significant contributions to the economy.
- Tracts in danger of conversion to non-forest uses within five years based upon local trends.

*In **maintaining cultural and economical contributions to rural communities,** priority will be given to*:

- Tracts which could contribute to the development or sustainability of local and regional wood products industries.
- Tracts owned by landowners who will work cooperatively to implement a long-term Forest Stewardship plan for their property.
- Tracts, which could contribute to the continuance of wildlife production and livestock grazing on forested lands, in accordance with owner objectives.

*In **protecting land for wildlife and unique, threatened or endangered species,** priority will be given to*:

- Tracts adjacent to public lands managed for wildlife habitat.

- Tracts that currently exhibit connective habitats, migratory corridors, habitat linkages and areas of biological isolation.
- Tracts owned by landowners who will identify and protect areas with species or communities of concern and manage for key habitats.
- Tracts owned by landowners who will restore and/or maintain forest cover and structure to provide habitat connectivity for the range of wildlife species that would normally populate the area.

*In **maintaining scenic values and protecting natural beauty,** priority will be given to*:

- Tracts that contain unique or outstanding natural beauty, including vegetation, topographic and geological features and scenic views.
- Tracts whose owners will preserve, protect and enhance unique and outstanding features of natural beauty on their lands.

*In **providing opportunities for public outdoor recreation,** priority will be given to:*

- Tracts whose owners will allow restricted public access for such purposes as hunting, fishing, bird watching, and hiking.
- Tracts that contain unique natural beauty, including vegetation, wildlife topographic and geological features and scenic views.

The Forest Legacy Program can help address the primary threats to Oklahoma's forestlands which are described earlier in this document. By working with owners of large, unbroken tracts, parcelization and fragmentation can be reduced. Through Forest Stewardship plans developed with landowners enrolled in Forest Legacy, forest health, productivity and sustainability issues can be addressed using appropriate land management practices. Finally, by protecting forestlands through permanent conservation easements or outright purchase, Forest Legacy can help to alleviate the permanent loss of forest resources throughout Oklahoma, thus protecting these lands for their economic, recreation, water quality, cultural, and ecological benefits.

The Forest Legacy Areas will be discussed more in the Oklahoma Forest Resource Strategy with how funding will be focused and how the major goals and objectives will be implemented.

Multi-State Areas (Regional Priority)

This section illustrates and describes a few important forest areas found in Oklahoma that cross state boundaries. These are large project areas where funding can be focused on a landscape scale across multiple states.

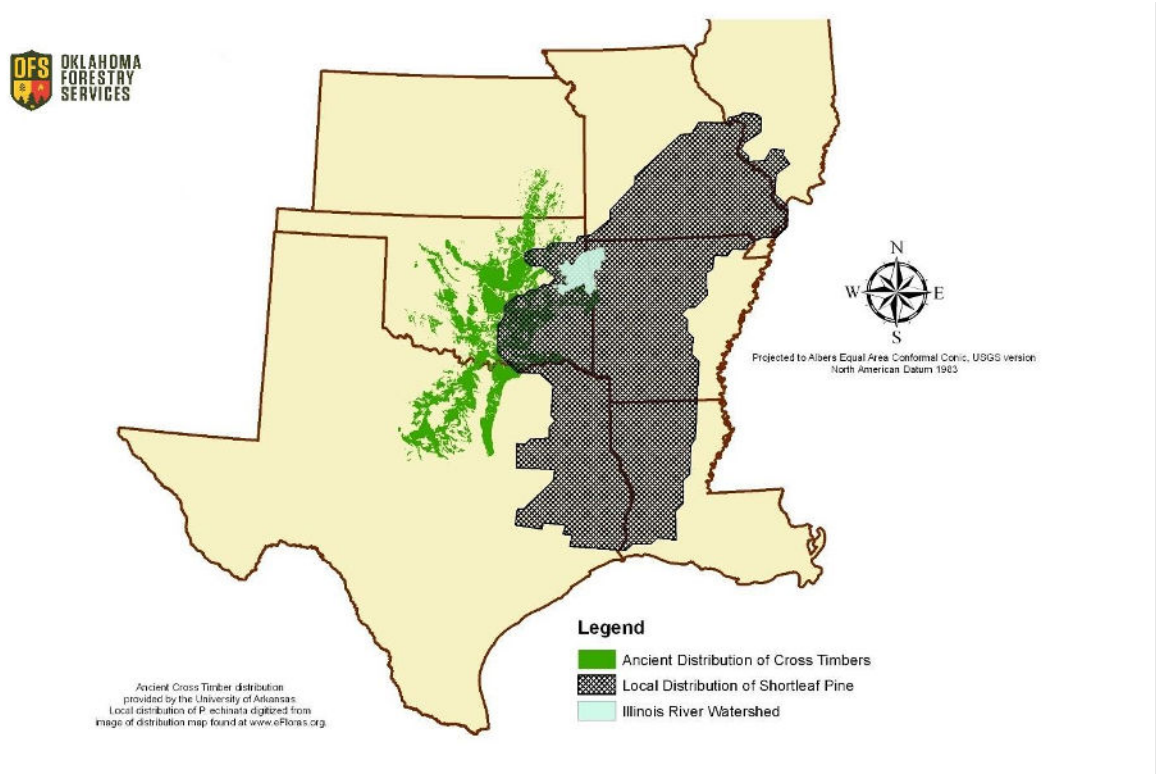

Figure 24: Multi-State priority areas.

Project Area: Cross Timbers – Post oak – Blackjack oak Forest Type

The Cross Timbers is a large area that spreads from north-central Texas through Oklahoma into southern Kansas and western Arkansas. This Cross Timbers area and the post oak – blackjack oak forest type is discussed in detail in this Plan. The ancient Cross Timbers tracts are threatened by conversion to non-forest uses and are areas that should be conserved and managed for future generations. This forest type receives little funding and is being lost to conversion to crop and range land, as well as urbanization and associated development. Increased feasibility of the wood biomass energy market and expansion of the traditional forest products industry into these hardwood forests are likely to impact them in the next five years. A federal FY 2012 landscape scale restoration grant provided impetus for a renewed focus on this unique ecosystem.

States: Oklahoma, Texas, Kansas and Arkansas

Project Area: Illinois River Watershed

The Illinois River Watershed is located in northeast Oklahoma and northwest Arkansas and is a valuable and controversial watershed. This area is comprised of oak-hickory, oak-pine and bottomland hardwood forest types. The Illinois River is located in the middle of this area and is a popular recreation area. Pollution in the river, tributaries and lakes has been a significant concern to the surrounding communities. The forestlands in this area are important to maintaining and

enhancing the water quality of the area. There are numerous issues associated with this watershed and collaborative management of the watershed is vital to enhance water quality as well as wildlife and aquatic habitats.

States: Oklahoma and Arkansas

Project Area: Shortleaf Pine Restoration

Shortleaf pine is the most widespread native southern pine and is common in adjoining states to our south and east, including Missouri. However, on many sites previously occupied by shortleaf, loblolly pine is preferred for forest regeneration purposes due to shortleaf's slower growth rate. As a native species adapted to droughty sites, with the ability to sprout following fire, shortleaf may be better able to provide forest cover under changing climate conditions in the western fringes of the pine range. Shortleaf pine management, combined with prescribed burning, may improve wildlife habitat, restore habitat for the Red-Cockaded Woodpecker on some sites, protect forest watersheds and water quality, sustain quality timber supplies, and provide more aesthetically pleasing scenic value to the traveling public and buffer communities and public lands from the risks and ravages of wildfire. Ecosystem services from all lands, including public lands (e.g., state parks and wildlife management areas), may be more sustainable where natural resource managers favor well-adapted native species, especially on marginal sites. There is an opportunity for Oklahoma and the adjoining states to focus greater attention on restoring shortleaf on sites where it is better adapted to long-term growing conditions, and able to survive increased use of prescribed fire to maintain these native forest ecosystems, especially on public lands. A competitive grant was approved in federal FY 2010 for a shortleaf pine initiative, and involved the states of Oklahoma, Texas, Arkansas and North Carolina. A federal FY 2014 competitive grant between Oklahoma and Arkansas built upon previous efforts and expanded the use of prescribed fire for shortleaf management and restoration. These and other projects are in support of a range-wide shortleaf pine initiative.

States: Oklahoma, Missouri, Texas and Arkansas

Appendices

Appendix A: Glossary

Biodiversity – the variability among living organisms within species, between species, and between ecosystems.

Bioenergy – renewable energy derived from biological sources, to be used for heat, electricity, or vehicle fuel.

Biomass – the living or dead weight of organic matter in a tree, stand, or forest or harvesting the wood product obtained from in-woods chipping of all or some portion of trees including limbs, tops, and unmerchantable stems, usually for energy production.

Carbon Sequestration – storage of carbon dioxide, the uptake and storage of carbon dioxide by trees, plants and soil.

Cropland – land with an annually tilled crop.

Crown Cover – percentage of the ground surface covered by a vertical projection of crowns from above.

Ecoregion - an ecologically and geographically defined area that is characterized by its biodiversity, flora, fauna and ecosystems.

Ecosystem – a dynamic complex of communities of plants, animals and other organisms interacting with their non-living environment as a functional unit. Examples: Urban Park, wetlands, forests, grasslands, etc.

Estuary – a bay at the mouth of a river where the tide meets the river current.

Exotic – a plant or species introduced from another country or geographic region outside its natural range.

Federal Forestland – forestland owned by the federal government.

Forestland – land at least 10% stocked (see stocking definition) by forest trees of any size or formerly having such tree cover and not currently developed for non-forest uses, with a minimum area classification of 1 acre (USDA Forest Service and Oklahoma Forestry Code definition).

Forest Trees – plants having a well-developed, woody stem and usually more than 12 feet in height at maturity (USDA Forest Service – Forest Inventory and Analysis definition).

Forest Type – a classification of forest land based upon the trees or tree communities that constitute the majority of stocking on the site.

Forestry – the profession embracing the science, art, and practice of creating, managing, using, and conserving forest and associated resources for human benefits in a sustainable manner to meet desired goals, needs, and values (Note: The broad field of forestry consists of those biological, quantitative, managerial, and social sciences that are applied to forest management and conservation; it includes agroforestry, urban forestry, industrial forestry, nonindustrial forestry, and wilderness and recreation forestry.)

Greenbelt or Green Space – a park-like strip of unoccupied land with little or no development, usually surrounding or partially surrounding urban areas.

Green Infrastructure – strategically planned and managed networks of natural lands, working landscapes and other green spaces that conserve ecosystem values and functions and provide associated benefits to human populations.

Hardwoods – dicotyledonous trees, usually broadleaved and deciduous (sheds leaves in the fall). Examples include hickories, maples, elms and oaks.

Introduced Species – an established plant or animal not native to the ecosystem.

Invasive Species – a nonnative species (plants, insects, fish, pathogens, mammals, birds, reptiles, etc.) that causes or is likely to cause economic or environmental harm or harm to human health.

Karst – topography with sinkholes, caves and underground drainage that is formed by dissolution in limestone, gypsum, and other rocks.

Native Species – an indigenous species that is normally found as a part of a particular ecosystem.

Prescribed Fire/Burn – to deliberately burn wildland fuels in either their natural or their modified state under specified environmental conditions, which allows the fire to be confined to a predetermined area and produces the fireline intensity and rate of spread required to attain planned resource management objectives.

Private Forestland – forestland owned by individuals, families, corporations, organizations, tribes, or the forest industry.

Primary Wood Product Producer – a processor of wood in raw log form. This includes sawmills, portable sawmills, pulp and paper mills, veneer mills and specialty mills.

Priority Forestland – areas found to have the highest priority because of the number of factors threatening the forestlands.

Pulp – separated wood fibers used in manufacturing paper and allied products.

Pulpwood – roundwood, whole-tree chips or wood residues used for the production of wood pulp for paper and paper products.

Rangeland - land supporting vegetation suitable for grazing, including grazable woodland and shrubland.

Riparian – related to, living, or located in conjunction with wetlands, on the bank of a river or stream but also at the edge of a lake or tidewater.

Roundwood – refers to the length of cut tree such as a log, usually with a round cross-section, with or without bark.

Saw logs – trees or logs cut from trees with a minimum diameter and length and with stem quality suitable for conversion to lumber.

Secondary Wood Product Producer – a processor of wood from primary producers that adds additional value. This includes window, door, furniture, pallet and crafting, envelope and box manufacturers.

Silviculture – the art and science of controlling the establishment, growth, composition, health and quality of forests and woodlands to meet the diverse needs and values of landowners and society on a sustainable basis.

Softwoods – coniferous trees, usually evergreen (retains leaves throughout the year) having needles or scale-like leaves. Examples include pines, junipers and cedars.

State Forestland – forestland owned by the state and local governments.

Stocking – a loose term for the amount of anything on a given area, particularly in relation to what is considered the optimum (usually in terms of numbers of trees or basal area per acre).

Timberland (Productive forestland) – forestland capable of producing in excess of 20 cubic feet per acre per year and not legally withdrawn from timber production, with a minimum area classification of 1 acre (USDA Forest Service – Forest Inventory and Analysis definition).

Transition Zone – an area where a distinct boundary between two or more different conditions cannot be determined.

Unproductive Forestland – forestland that produces less than 20 cubic feet per acre per year.

Watershed – a region or land area drained by a single stream, river or drainage network.

Wildfire – any nonstructure fire, other than prescribed fire, occurring on wildland.

Wildland – land other than that dedicated for other uses such as agricultural, urban, mining, or parks.

Wildland Urban Interface – an area where increased human influence and land use conversion are changing natural resource goods, services and management.

Woodland – where stocking cannot be determined, at least 5 percent crown cover by trees of any size or has had at least 5 percent cover in the past (USDA Forest Service – Forest Inventory and Analysis definition).

Sources: USDA Forest Service, Oklahoma Forestry Services, Society of American Foresters, The Southern Forest Futures Project, World Resources Institute 2010.

Appendix B: Programs and Plans

Community Wildfire Protection Plans

The incentive for communities to engage in comprehensive forest planning and prioritization was given new and unprecedented impetus with the enactment of the Healthy Forests Restoration Act (HFRA) in 2003. This legislation includes the first meaningful statutory incentives for the U.S. Forest Service and the Bureau of Land Management to give consideration to the priorities of local communities as they develop and implement forest management and fuel reduction projects.

In order for a community to take full advantage of this opportunity, it must first prepare a Community Wildfire Protection Plan (CWPP). Local wildfire protection plans can take a variety of forms, based on the needs of the people involved in their development. CWPPs may address issues such as wildfire response, hazard mitigation, community preparedness, or structure protection – or all of the above.

The process of developing a CWPP can help a community clarify and refine its priorities for the protection of life, property, and critical infrastructure in the wildland urban interface. It also can lead community members through valuable discussions regarding management options and implications for the surrounding watershed.

The language in the HFRA provides maximum flexibility for communities to determine the substance and detail of their plans and the procedures they use to develop them. Because legislation is general in nature, some communities may benefit from assistance on how to prepare such a plan. A handbook is available to provide communities with a concise, step-by-step guide to use in developing a CWPP. If interested in more information, contact Oklahoma Forestry Services at 405-522-6158 or visit http://www.communitiescommittee.org/pdfs/cwpphandbook.pdf.

As of September 2015, 63 communities across the state have a completed CWPP and 11 more are in the process of completing theirs. Three communities have been in the program long enough and are working on renewing their CWPP. Work completed as described in the CWPP can lead to recognition as a Firewise community. In September 2015, there were 33 Firewise communities in Oklahoma.

Forest Inventory and Analysis Program

The Forest Inventory and Analysis (FIA) Program has been in operation since 1930 surveying forestlands within the United States. The FIA program collects, analyzes, and reports information on the status and trends of America's forests: how much exists, where it exists, who owns it, and how it is changing, as well as how the trees and other forest vegetation are growing and how much has died or has been removed in recent years. The forest resource data collected is used to monitor tree growth and harvests, but also tree species and land-use patterns, forested wildlife habitat, mortality, and other forest health attributes, regional biological processes, timber and nontimber forest products, and associated human activities. This information is essential for evaluating whether current forest management practices are sustainable in the long run and whether current policies will allow future generations to enjoy America's forests. For more information about the FIA Program visit: www.fia.fs.fed.us/.

Forest Legacy Program

Authority and Purpose of Forest Legacy Program

The purpose of the Forest Legacy Program (FLP) is to identify and protect environmentally important forestland from conversion to non-forest uses, through the use of conservation easements and fee purchase negotiated with willing landowners. The purposes of the Assessment of Need (AON) are to document the need for a Forest Legacy Program in Oklahoma; to analyze the state's forest resources and the threats impacting the benefits provided by our forests; to identify and delineate the boundaries of forest areas meeting the eligibility criteria for designation as Forest Legacy Areas; and to recommend specific areas to the U.S. Forest Service and Secretary of Agriculture for inclusion in the Forest Legacy Program.

Oklahoma's participation in the Forest Legacy Program is predicated on several factors.

1. Public recognition that our forestlands as a whole are an invaluable natural resource that provides incomparable benefits to the state's citizens.
2. The working forests that provide these public benefits must be managed and sustained for present and future generations.
3. Some forests contain exceptional features that are worthy of protection for the long term, with assistance from state and federal government resources.
4. Many of Oklahoma's important forestlands are threatened by conversion to non-forest uses, with a subsequent loss of public as well as private forest benefits.
5. Assuring the long-term sustainability and maintenance of these important lands can best be achieved through a partnership between government, private landowners and non-governmental organizations with similar goals.
6. There will never be enough public funds to protect all of the state's most valuable working forests. However, the Forest Legacy Program will help raise awareness, establish a mechanism and serve as a model program for similar efforts in Oklahoma.

Legacy is guided by federal legislation, USDA Forest Service guidelines and State directives, policies and laws. Oklahoma Forestry Services of the Oklahoma Department of Agriculture, Food and Forestry offers this Assessment of Need as the guiding document for Forest Legacy Program (FLP) implementation in Oklahoma.

Enabling Legislation and Authorization

The federal Cooperative Forestry Assistance Act of 1978, as amended (16 U.S.C. 2103c et. seq.), authorizes the U.S. Secretary of Agriculture to provide financial, technical, educational and related assistance to States, communities, and private forest landowners. Section 1217 of Title XII of the Food, Agriculture, Conservation and Trade Act of 1990 (P.L. 101-624:104 stat.3359), also referred to as the 1990 Farm Bill, amended the Cooperative Forestry Assistance Act and allows the Secretary to establish the Forest Legacy Program to protect environmentally important forest areas that are threatened by conversion to non-forest uses. Through the 1996 Farm Bill (Federal Agricultural Improvement and Reform Act of 1996; P.L. 104-127); Title III – Conservation; Subtitle G – Forestry; Section 374, Optional State Grants for Forest Legacy Program), the Secretary is authorized, at the request of a participating state, to award grants for the state to carry out the FLP, including acquisition of lands and interests in lands.

In 2001, Governor Frank Keating designated Oklahoma Forestry Services of the Oklahoma Department of Agriculture, Food & Forestry as the state lead agency to develop and administer the Forest Legacy Program in Oklahoma. The Cooperative Forestry Assistance Act directs the Secretary to establish eligibility criteria for the designation of Forest Legacy Areas, in consultation with the Forest Stewardship Coordinating Committee. These criteria are developed based upon the State lead agency's Assessment of Need for establishing a State Forest Legacy Program.

Background

To participate in the FLP, each state must develop an Assessment of Need, which identifies important forestlands, called Forest Legacy Areas (FLAs), in need of long-term protection and management. The maximum federal contribution for total program costs may not exceed 75 percent. Twenty-five percent of FLP costs may consist of matching funds or in-kind contributions from non-federal sources.

Public Involvement Process

Initially, the Oklahoma Department of Agriculture, Food and Forestry, Forestry Services, the lead agency in the Forest Legacy Program, contracted the Trust for Public Land (TPL) to gather information and develop the Assessment of Need (AON). In order to gather necessary input, TPL sent 117 surveys to stakeholders across the state of Oklahoma asking about various aspects of forest health and what the goals of the Forest Legacy Program should be. Stakeholders included government agencies, tribes, universities, and private landowners, both industrial and non-industrial. At the same time, eight one-on-one meetings and four phone meetings with members of the Forest Stewardship Committee and other professionals were conducted.

The survey asked individuals to rate certain objectives. These objectives included:

- Maintaining traditional forest uses.
- Protecting and enhancing water quality.
- Protecting lands adjacent to waterways and lakes.
- Conserving highly productive soils and soil stability.
- Assisting in forest health.
- Protecting significant cultural resources.
- Conserving lands that provide habitat for unique, threatened, or endangered species.
- Protecting or enhancing fisheries and wildlife habitat.
- Maintaining and enhancing economic contributions to rural communities.
- Preventing fragmentation of ownership on forested land base.
- Maintaining scenic values, including frontage along rural and scenic roads.
- Enhancing existing or potential public recreation values.

In addition, two broad questions were asked to receive a general understanding of what direction the program should take in Oklahoma. These were:

1) What goals and objectives do you feel the Forest Legacy Program in Oklahoma should achieve?
2) What geographic areas do you believe constitute forest resources worthy of protection priority?

Landowner Participation

(Application process, evaluation, selection, acquisition, use of easements, management, eligibility criteria for areas as a whole and for individual properties within those areas)

Interested landowners are key in the development of the Forest Legacy Program. Landowner participation in the program is voluntary and shall consist of two elements:

1) Conveyance of interests in lands to achieve the land conservation objectives of the Forest Legacy Program; and
2) Preparation of a Stewardship Management Plan or multi-resource management plan for protected sites. The management plan must be prepared and approved prior to signing the acquisition of the easement. Future modifications of the plan must be agreed to by the State lead agency. A plan is not needed if the landowner does not retain the right to harvest timber or conduct other land or resource management activities, or if the land is sold in fee.

Landowners may submit to the State lead agency an application for enrollment of interests in their lands in the FLP. All owners of private forests within the designated FLA are eligible to submit an application.

For a landowner to participate in the program, it is not required that their tracts be completely forested. However, priority will generally be given to tracts that are currently forested or are identified to be forested in the landowner Stewardship Management Plan.

Application requirements for landowner participation in the FLP are shown below:

Landowners or their designated representatives may submit their application to the Forestry Division and will be asked to supply information about the property proposed for entry into the program.

Forestry Services, along with the Stewardship Committee, shall cooperatively review the applications and establish State acquisition priorities and continue with landowner consultation. Priority for FLP acquisitions shall be given to lands which can be effectively managed; and which have important scenic or recreational values, riparian areas, timber, fish and wildlife values, including threatened and endangered species, or other ecological values.

The FLP respects the rights of private property holders. Under no circumstance shall the right of eminent domain be used for the unwilling taking of any property rights. Conservation easements or deed reservations acquired or reserved pursuant to the FLP are intended to allow continued forest management activities deemed consistent with Forest Legacy purposes.

Tree City USA and Tree Line USA Program

The Tree City USA and Tree Line USA program, sponsored by the National Arbor Day Foundation in cooperation with the USDA Forest Service and the National Association of State Foresters, provide direction, technical assistance, public attention, and national recognition for urban and community forestry programs in thousands of towns and cities that more than 135 million Americans call home. The many benefits of being a Tree City include creating a framework for action, education, a positive public image, and citizen pride.

Oklahoma Forestry Services supports and endorses the Tree City USA and Tree Line USA program in partnership with the National Arbor Day Foundation. Communities recognized for this annual certification are the leaders in Oklahoma when it comes to conserving, enhancing and protecting the urban and community tree cover across the state.

Incorporated Natural Resource Plans or Projects

- Oklahoma Comprehensive Wildlife Conservation Strategy, 2016 (State Wildlife Action Plan). Ron Suttles, Natural Resources Supervisor. Oklahoma Department of Wildlife Conservation. www.wildlifedepartment.com/CWCS.htm

- Oklahoma Forest Legacy Plan, 2007 (Draft Assessment of Need). Kurt Atkinson, Assistant Director. Oklahoma Forestry Services. www.forestry.ok.gov

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- Oklahoma Comprehensive Water Plan, 2009 in development. Oklahoma Water Resources Board. http://environ.okstate.edu/OWRRI/waterplan/

- Southern Forest Futures Project, 2009 in development. USDA Forest Service and Southern Group of State Foresters. http://www.srs.fs.usda.gov/futures/

- Oklahoma Forest Resource Issues 1980 and Program Direction through 1995. John Burwell, State Forester. Oklahoma Department of Agriculture, Forestry Division.

Appendix C: Oklahoma Threatened and Endangered Species Information

This section includes federally listed threatened and endangered species descriptions. Endangered Species with no local account available include: Eskimo Curlew, Scaleshell Mussel, and Winged Mapleleaf Mussel.

- **American alligator (*Alligator mississippiensis*):**

Status: Threatened
Habitat: Alligators inhabit rivers, swamps, estuaries, lakes, and marshes.
Distribution: Alligators are found throughout the southeastern United States, from North Carolina to Texas. Oklahoma represents the northwestern most reaches of their range. The historic distribution in Oklahoma was limited to the Red River and Little River drainages in southeastern Oklahoma. Currently, alligators are considered to be an occasional visitor along the Red River in McCurtain County.
Causes of Decline: Alligators have declined in numbers due to overhunting and destruction of habitat. The young are at high risk from predation and human disturbance.

- **American burying beetle (*Nicrophorus americanus*)**

Status: Endangered
Habitat: Habitat requirements for American burying beetles (ABB), particularly reproductive habitat requirements, are not fully understood at this time. The ABB has been found in various types of habitat including oak-pine forests, open fields, oak-hickory forest, open grasslands, and edge habitat.
Distribution: The historical distribution of the American burying beetle included the eastern half of North America. This range included the eastern half of Oklahoma. At this time, there are only 3 known areas of occurrence. Two of these are in Oklahoma and one is in Rhode Island, but the range includes 8 states, Rhode Island, Massachusetts, South Dakota, Nebraska, Kansas, Arkansas, Texas, and Oklahoma.
Cause of Decline: The cause of decline of this species is not clearly understood. Declines could be a result of habitat fragmentation, habitat loss, carcass limitation, pesticides, disease, light pollution, or a combination of these factors.

- **Arkansas River Shiner (*Notropis girardi)***

Status: Threatened
Habitat: The shiner is native to wide, sandy-bottomed streams of the Arkansas River in Arkansas, Kansas, New Mexico, Oklahoma, and Texas.
Distribution: Historically, it was abundant throughout these portions of the Arkansas River and its tributaries. The shiner is presently almost entirely restricted to the Canadian/South Canadian River in Oklahoma, Texas, and New Mexico, a distance of about 508 river miles. A small, relict population is believed to remain in the upper Cimarron River in Kansas and Oklahoma.
Causes of Decline: The species is threatened by habitat destruction and modification from stream dewatering or depletion due to diversion of surface water and groundwater pumping, construction of impoundments, and water quality degradation. Other causes include competition with introduced fishes, incidental capture, and drought.

- **Black-capped vireo (*Vireo atricapilla*)**

  Status: Endangered

  Habitat: Black-capped vireo habitat consists of scattered trees and brushy areas. The presence of oak trees appears to be more important to the vireo than junipers. Foliage that extends to ground level is the most important requirement for nesting. Most nests are between 15 and 50 inches (35-125 cm) above ground level and are screened from view by foliage. Territories are sometimes located on steep slopes, where trees are often clumped and intermediate in height. On level terrain, preferred black-capped vireo habitat is a mixture of shrubs and smaller trees that average from eight to 10 feet high (2.5-3.5 m). Black-capped vireos will no longer use sites where many trees are nearing full size.

  Distribution: The historic breeding distribution of the black-capped vireo extended south from south-central Kansas through central Oklahoma and Texas to central Coahuila, Mexico. At present, the range extends from Oklahoma south through the Edwards Plateau and Big Bend National Park, Texas, to at least the Sierra Madera in central Coahuila, Mexico. In Oklahoma, the black-capped vireo is found only in Blaine, Cleveland, and Comanche counties. The winter range of the black-capped vireo is not well known. It is thought to winter along the west coast of Mexico from southern Sonora to Guerrero.

  Causes of Decline: The black-capped vireo is threatened by brown-headed cowbird (*Molothrus ater*) nest parasitism, human disturbance, and loss of habitat to urbanization, fire exclusion, grazing, and brush control.

- **Eastern prairie fringed orchid (*Platanthera leucophaea*)**

  Status: Threatened

  Habitat: The eastern prairie fringed orchid is found in moist to wet tallgrass prairie.

  Distribution: A historic record exists for Choctaw County, Oklahoma, but the plant has not been observed in the past 150 years.

  Causes of Decline: The major factor in the decline has been a loss of habitat due to grazing, fire suppression, and agricultural conversion.

- **Gray Bat (*Myotis grisescens*)**

  Status: Endangered

  Habitat: Gray bats almost always roost in caves year-round. Historically, hibernation caves could contain well over a million individuals. Summer colonies can reach 250,000 individuals. Gray bats have very specific cave requirements. As a result, fewer than five percent of available caves are suitable. Winter caves must be very cold with a range in temperature between 42° and 52°F (6-11°C). Winter caves are deep with vertical walls. Summer caves must be warm (57-77°F or 14-25°C) or with restricted rooms that can trap the body heat of roosting bats. Summer caves are located close to rivers or lakes where the bats feed. Bats are known to range at least 12 miles (20 km) from their colony to feed.

Distribution: Gray bat distribution is limited to limestone cave areas of the southeastern United States. Major populations are found in Alabama, Arkansas, Kentucky, Missouri, and Tennessee. Smaller populations may occur in surrounding states. In Oklahoma, the historic population probably was limited to the limestone region of the northeastern part of the state. At present, this bat is found in only four counties in northeastern Oklahoma - Adair, Cherokee, Delaware, and Ottawa. Gray bats may occur in caves in other counties, but there have been no recent sightings. No hibernation caves are known in Oklahoma.
Causes of Decline: The gray bat is extremely vulnerable to human disturbances at roosting caves. This is especially true at hibernation and maternity caves. The gray bat is also threatened by pesticides, loss of habitat due to flooding by man-made impoundments, commercializing of caves, and improper gating of caves.

- **Indiana bat (*Myotis sodalis*)**

  Status: Endangered

  Habitat: For hibernation, Indiana bats need limestone caves with stable temperatures of 39º to 46ºF and 66 to 95 percent humidity. Only a small percentage of the caves meet the specific conditions. During the summer, they can be found under tree bark, in hollow trees, under bridges, or in old buildings. Indiana bats forage above small to medium sized streams. Streams lined with large, overhanging trees are preferred.

  Distribution: The Indiana bat is found primarily in the Midwestern and eastern United States. Oklahoma is the western limit of its range. The present Oklahoma range includes Adair, Delaware, LeFlore, and Pushmataha counties. It is now rare in Oklahoma and usually only scattered individuals are found. They may be in company with gray bats.

  Causes of Decline: Indiana bats are subject to both natural and human threats. Periodic flooding of winter caves and the collapse of cave or mine ceilings both pose threats. However, the most serious threat to Indiana bats is the disturbance of hibernating colonies by spelunkers or vandals. Pesticides, the commercialization of roosting caves and the channelization of streams also pose threats.

- **Interior least tern (*Sterna antillarum*)**

  Status: Endangered

  Habitat: Interior least terns favor islands or sandbars along large rivers for nesting. The sand must be mostly clear of vegetation to be used by the terns. Least terns prefer shallow water for fishing. Water levels must be low enough so that nests stay dry.

  Distribution: The historic distribution of the interior least tern was the major river systems of the Midwestern United States. These rivers included the Red, Rio Grande, Arkansas, Missouri, Ohio, and Mississippi river systems. In Oklahoma, interior least terns nest along larger rivers, as well as at the Salt Plains National Wildlife Refuge near Jet, Oklahoma.

  Causes of Decline: Many nesting areas have been permanently flooded by reservoirs and channelization projects. Unpredictable water discharge patterns below dams flood nesting areas. Overgrowth of brush and trees also eliminates remaining habitat. The

recreational use of sandbars by humans is a major threat to the tern's reproductive success.

- **Leopard darter (*Percina pantherina*)**

Status: Threatened
Habitat: Leopard darters are found in intermediate to larger streams. From May to February, leopard darters prefer large, quiet pools with a rubble and boulder substrate. Spawning occurs on gravel substrates.
Distribution: Historically, the leopard darter was limited to upland, large stream habitats of the Little River drainage in Oklahoma and Arkansas. Currently, scattered populations are found within its historic range. In Oklahoma, it occurs within the Little River drainage in LeFlore, McCurtain, and Pushmataha counties.
Causes of Decline: Leopard darters have never been common. The greatest threat to the survival of the species is the loss of habitat due to the construction of reservoirs. These impoundments also isolate populations, which further endangers the species. Logging activity like road construction, agricultural and industrial runoff, and gravel removal all pose threats as well.

- **Neosho madtom (*Noturus placidus*)**

Status: Threatened
Habitat: The preferred habitat of adult Neosho madtoms is shallow riffles with loose, uncompacted gravel bottoms. They are occasionally found in areas with sandy bottoms covered with leaf litter. Young Neosho madtoms may be found in deeper pools, downstream from riffles.
Distribution: Historically, the Neosho madtom was found in the Neosho, Cottonwood, Spring, and Illinois Rivers in Kansas, Missouri, and Oklahoma. It is believed to be no longer present in the Illinois River and scattered through the rest of its historic range. In Oklahoma, it is present only in Ottawa and Craig counties.
Causes of Decline: The Neosho madtom has declined due to habitat destruction. Construction of dams, dredging of gravel, and an increase in water demands have contributed to habitat loss. Pollution from cattle feedlot runoff has adversely affected the fish as well.

- **Ouachita rock pocketbook mussel (*Arkansia wheeleri*)**

Status: Endangered
Habitat: The Ouachita rock pocketbook inhabits pools, backwaters, and side channels of certain rivers and large creeks in or near the southern slope of the Ouachita Uplift. The species occupies stable substrates containing gravel, sand, and other materials.

The Ouachita rock pocketbook always occurs within large mussel beds containing a diversity of mussel species.

Distribution: The historical distribution of the Ouachita rock pocketbook included the Kiamichi River in southeastern Oklahoma, the Little River in southwestern Arkansas, and the Ouachita River in central Arkansas. Recent surveys have found it surviving in a small section of the Little River in Oklahoma, at one locality in the Ouachita River in Arkansas, and within an 88-mile (141 km) section of the Kiamichi River upstream from Hugo Reservoir. Other recent evidence of the species includes single shells recovered from Pine and Sanders Creeks in Texas.
Causes of Decline: The range of the Ouachita rock pocketbook has been reduced due to the construction and operation of dams and by decreases in water quality. These and other factors pose continuing threats to the species.

- **Ozark Big-eared bat (*Corynorhinus [=Plecotus] townsendii ingens*)**

  Status: Endangered

  Habitat: Caves used by Ozark big-eared bats are located in karst regions dominated by oak-hickory forests. The temperature of hibernation caves ranges from 40° to 50°F (4-9°C). Maternity colonies are located in caves that range in temperature between 50° and 59°F (10-15°C). Ozark big-eared bats forage along forest edges.

  Distribution: The distribution of the Ozark big-eared bat was probably limited to northwestern Arkansas, neighboring Oklahoma and Missouri. In Oklahoma, this subspecies is known to occur in Adair, Cherokee, Delaware, and Ottawa counties. There is a historical record for Sequoyah County.
  Causes of Decline: The Ozark big-eared bat was probably never very common. The species is intolerant of human disturbance, which causes them to abandon favorite roosts. Disturbance of hibernating bats causes them to use valuable fat stores and increases the probability of starvation during the winter. Disturbance of maternity colonies can cause significant mortality of the young.

- **Ozark cavefish (*Amblyopsis rosae*)**

  Status: Threatened

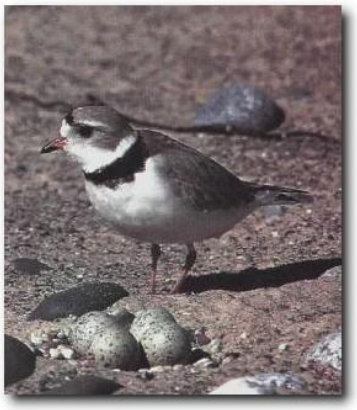
  Habitat: Caves which have populations of the Ozark cavefish all have a relatively large source of nutrients, such as bat guano or blown leaf litter. Water quality in caves that contain cavefish is usually high. Ozark cavefish are able to tolerate the extremely low oxygen content of ground water found in caves. Cavefish tend to occur in flowing cave streams as opposed to quiet pools.

  Distribution: The Ozark cavefish is native to the Springfield Plateau of the Ozark Highlands (southwestern Missouri, northwestern Arkansas, and northeastern Oklahoma). Currently, 15 caves in this area have verified cavefish populations. In Oklahoma, populations are known to occur in Delaware

County. There are historical records for Ottawa and Mayes counties. **Causes of Decline**: Factors that have led to the decline of the Ozark cavefish include destruction of habitat, collecting of specimens, and disturbance by spelunkers.

- **Piping plover (*Charadrius melodus*)**

Status: Threatened (Endangered in the watershed of the Great Lakes.)
Habitat: Piping plovers nest on sandy beaches along the ocean or lakes. Along rivers, piping plovers use the bare areas of islands or sandbars. They also nest on the pebbly mud of interior alkali lakes and ponds. Birds nesting on gravel have higher reproductive success than those nesting on alkali. During the winter, piping plovers use algal, mud, and sand flats along the Gulf Coast. Spoil islands in the intracoastal waterway are also used.



Distribution: Historically, piping plovers bred along the Atlantic Coast, on the Northern Great Plains, and around the Great Lakes. Piping plovers winter along the southern Atlantic and Gulf coasts, and in the Bahamas and West Indies. Although drastically reduced, remnant populations occur throughout their historic range. Piping plovers migrate through Oklahoma each spring and fall. **Causes of Decline**: Piping plovers have been drastically reduced in number, due to the loss of beach habitat and to the modification of habitat through the channelization and damming of rivers. These practices eliminate sandbars and allow the growth of vegetation on nesting areas. Nesting success of piping plovers on beaches used by humans is much lower than on isolated beaches, because of disturbance.

- **Red-cockaded woodpecker (*Picoides borealis*)**

Status: Endangered
Habitat: Red-cockaded woodpeckers live in old-growth (60-70+ years) loblolly, shortleaf, and especially slash and longleaf pine forests. Nesting and roosting cavities are generally made only in living pine trees over 60 years old. These trees produce large amounts of resin around the woodpeckers' cavities. The resin is thought to discourage potential predators, such as the black rat snake, from climbing the tree and attacking the woodpeckers. Ideal colony sites are located in parklike stands of pines with little or no understory growth. Foraging habitat of the woodpecker includes extensive pine or pine-hardwood forests. Fire plays an important part in maintaining red-cockaded woodpecker habitat by eliminating hardwood undergrowth.

Distribution: The historic distribution of the red-cockaded woodpecker included the southeastern United States. They ranged from Florida north to Virginia and west to eastern Texas and Oklahoma. In Oklahoma, they were restricted to the shortleaf pine area of southeastern Oklahoma. The red-cockaded woodpecker once occupied Bryan, Latimer, LeFlore, McCurtain, Pittsburg, and Pushmataha counties. The current distribution in Oklahoma includes only a limited area of McCurtain and Pushmataha counties. The Pushmataha colony was inactive in

1992.

Causes of Decline: Red-cockaded woodpeckers have declined primarily due to the loss of suitable habitat. Short-term-rotation timber management of private and public forests has eliminated much of the old-growth pine forest necessary to maintain healthy woodpecker populations.

- **Whooping Crane (*Grus Americana*)**

  Status: Endangered

  Habitat: Whooping cranes inhabit marshes and prairie potholes in the summer. In winter, they are found in coastal marshes and prairies.

  Distribution: Historically, whooping cranes were found from the Northwest Territories in Canada through the prairie provinces and northern prairie states to Illinois. The whooping crane formerly wintered in the Carolinas, along the Texas Gulf Coast, and on the intermountain plateau of central Mexico. Currently, an experimental population summers in Idaho and winters in New Mexico. The main population breeds in northern Canada and winters along the Texas Gulf Coast. It passes through western Oklahoma each spring and fall during migration. The Salt Plains National Wildlife Refuge, near Jet, Oklahoma, is a very important migration stopover area. During migration, whooping cranes sometimes are sighted elsewhere in Oklahoma along rivers, in grain fields, or in shallow wetlands.

  Causes of Decline: Whooping cranes have declined primarily because of loss of wintering and breeding habitat. Shootings and collisions with powerlines or fences have been sources of mortality in recent years.

- **Western prairie fringed orchid (*Platanthera praeclara*)**

  Status: Threatened

  Habitat: The western prairie fringed orchid is a plant of the tallgrass prairie and requires direct sunlight for growth. It is most often found in moist habitats or sedge meadows. Western prairie fringed orchids have persisted in areas that have been lightly grazed, periodically burned, or regularly mowed. It is not yet understood how these activities affect plant survival. It may be that removal of dead grass mulch is beneficial, but heavy grazing is detrimental.

  Distribution: Historically, the western prairie fringed orchid was found in tallgrass prairies west of the Mississippi River. It occurred from extreme southern Canada south to northeast Oklahoma. In Oklahoma, historical records (1975) exist for Craig and Rogers Counties. Currently, extant populations of the orchid are found in Iowa, Kansas, Minnesota, Missouri, Nebraska, and North Dakota.

  Causes of Decline: The major factor contributing to the decline of the western prairie fringed orchid has been the conversion of native prairie to croplands. Fire suppression, overgrazing, and habitat fragmentation also have contributed to the decline of the species.

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Appendix E: Oklahoma Forest Action Plan – GIS Methodology

Map Models and Descriptions

The 2020 Oklahoma Forest Action Plan needed a method of objectively quantifying priority forestland areas. To accomplish this task, it was decided that the models used in the OFRA would be additive in nature: quantifiable variables pertaining to each issue would be overlapped; the areas with more overlapping variables would receive a higher issue priority. Within each model, a single variable was represented by a 30 meter resolution raster image covering the state, with cells containing a value from 0 to 2, depending on variable presence in that cell. Once added together, the resulting sum of variables produced a state-wide raster image that then needed to be divided into priority levels of high, medium, or low.

The Southern Forest Land Assessment (SFLA) in conjunction with a python model developed by the SGSF was used to identify the priority lands with variable weightings chosen by Oklahoma Forestry Services. After identifying Oklahoma's priority lands, a subsection of that was identified as stewardship priority lands.

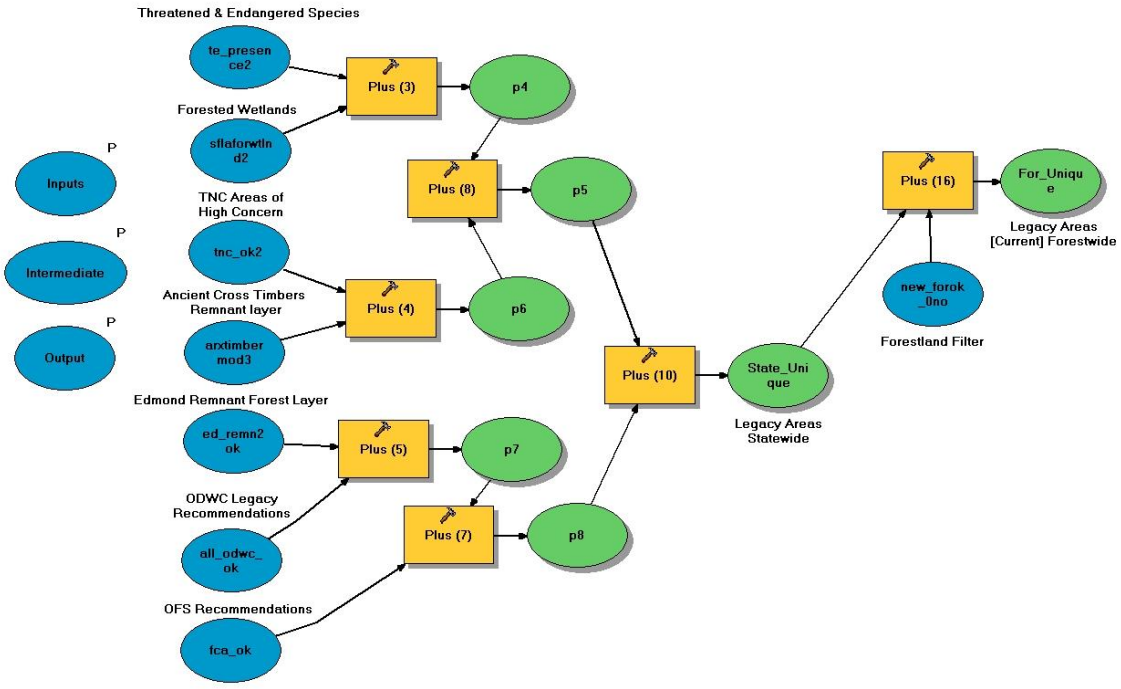
Forest Legacy Areas Map

The delineation of Forest Legacy areas followed a two phase methodology: first, a model was created to highlight priority areas; second, Level 12 watersheds containing areas of high priority were selected and merged to form areas of common factors (resulting in the seventeen Forest Legacy Areas depicted in the OFRA).

The legacy areas model was created using the following rasters (each containing a value of 2, where variable was found present): threatened and endangered species, forested wetlands (a layer taken from the SFLA), The Nature Conservancy's areas of high concern, the ancient cross timbers remnant layer (a model output produced by Dr. Krista Peppers, in 1994), Edmond's old growth remnant forest layer, the Oklahoma Department of Wildlife Conservation's areas recommended for legacy status, and a layer depicting the recommendations of Oklahoma Forestry Service personnel. Quantile breaks occurred at 0, 2, and 12.

On top of this statewide legacy model output, the Level 12 HUC (watersheds) layer was overlain. Areas considered of high priority were isolated, the containing watersheds selected, and those watersheds merged together to form the seventeen Forest Legacy Areas depicted on the OFLA map of the same name.

Figure 23: *Forest Legacy Areas Analysis Model*



Appendix F: Coordination with Stakeholders

4/9/2019 - Meeting with faculty from Oklahoma State University to discuss forest issues.

2/1/2020 – Meeting with USFWS, ODWC, and NWTF to discuss issues affecting wildlife enhancement and the Forest Action Plan.

5/3/2020 – Meeting with the NRCS regarding forest management and stewardship.

5/13/2020 - Discussion with ODWC about the State Wildlife Action Plan.

10/22/2020 – Meeting with USFS to discuss Good Neighbor Authority, Shared Stewardship, and input on Forest Action Plan.

10/30/2019 - Meeting with OWRB, OCC, NRCS, and Rural Water Association about source water concerns.

11/5/2020 – Meeting with State Technical Committee.

11/13/2020 - Meeting with ODWC, OCC, and NRCS to review forest identified forest issues.

Stakeholder List Includes:

Oklahoma Forest Advisory Committee (Stewardship Coordinating Committee): USDA Forest Service, USDA Natural Resources Conservation Service, USDOI Fish and Wildlife Service, Oklahoma Department of Wildlife Conservation, Oklahoma Department of Tourism and Recreation, Oklahoma Conservation Commission, Noble Foundation, The Nature Conservancy, Oklahoma State University, Oklahoma Forestry Association, Bureau of Indian Affairs, Oklahoma Forestry Services, Oklahoma Forest Industry.

State Technical Committee: Oklahoma Forestry Association, Noble Foundation, Oklahoma Conservation Commission, Oklahoma Forestry Services, Oklahoma Department of Environmental Quality, Oklahoma State University, US Fish & Wildlife Service, Natural Resource Conservation Service, US Forest Service.

*Not an exhaustive list of all members of the committees, only those that were met with.

SECTION 2

FOREST RESOURCE STRATEGY

Executive Summary

In 2008, the USDA Forest Service implemented a "Redesigned" State and Private Forestry Program (S&PF Redesign). It was formed in response to the combined impacts of increasing pressure on the nation's forests and decreasing S&PF resources and funds. Redesign focuses on three national priorities: conserve working forests, protect forests and enhance benefits from trees and forests. Under the S&PF Redesign, each state is required by the Cooperative Forestry Assistance Act (CFAA), as amended by the 2008 Farm Bill, to analyze its forest conditions and trends and delineate priority forest landscapes in a State Assessment.

Based on the State Assessment, a Statewide Forest Resource Strategy is required by each state and will become the foundation for formulating S&PF competitive project proposals and guiding S&PF program direction. Each State Forest Resource Strategy should:

- Outline long-term strategies and programs to address priority landscapes identified in State Assessments and the three national priorities
- Describe how the state proposes to invest funding to address management objectives
- Include long-term timeline for projects and program implementation
- Identify partner and stakeholder involvement
- Identify strategies for monitoring outcomes
- Describe how state's proposed activities will accomplish S&PF objectives
- Describe how S&PF programs will be used to address priority landscapes
- Incorporate existing statewide natural resource plans

States have been preparing the initial state assessments and strategies since 2008. Oklahoma Forestry Services (OFS), with the help of interested stakeholders and public input, completed the Oklahoma Forest Resource Assessment Draft in March 2010. With input from stakeholders, OFS identified six critical issues impacting Oklahoma's forestlands. A geospatial analysis was conducted to delineate high priority areas across Oklahoma where future efforts might be focused for each of the following issues:

- Forest Sustainability and Health
- Wildfire Risks to the Forest Resource
- Forest Economics and Markets
- Water Quality and Availability
- Community Forest Health and Care
- Impacts of Climate Change

Oklahoma's Forest Resource Strategy highlights how OFS plans to utilize resources to address the six critical issues and priority areas identified in the Oklahoma Forest Resource Assessment. This document will also provide OFS with the framework to develop service area action plans. The strategy document is organized into four main sections:

- **State and Private Forestry Redesign National Priorities:** Provides an overview of the "Redesigned" S&PF Program and the national priorities.
- **Oklahoma Forestry Services Overview and Program Areas:** Outlines what the division's responsibilities entail and provides general descriptions of all current OFS programs.
- **Strategic Issues Threatening Oklahoma's Forest Resources and Priority Areas:** This is the most important part of this document, where priority area maps as well as goals, objectives, and long-term strategies outline how OFS and interested stakeholders plan to address the issues impacting our forests. There is a matrix for each issue which demonstrates the resources needed to accomplish long-term strategies and links each strategy to a national priority.
- **National Priorities – Performance Measures:** Each long-term strategy is linked to one or more of the national priorities and in this section of the document, performance measures are outlined for the national priorities.

State and Private Forestry Redesign – National Priorities

In 2007, the USDA Forest Service and National Association of State Foresters (NASF) assembled a State and Private Forestry (S&PF) Redesign Board to review the current trends affecting trees and forests and to consider the most effective roles for state and federal government in sustaining forest benefits. The purpose of redesigning S&PF is to shape and influence forestland use on a scale and in a way that optimizes public benefits from trees and forests for both current and future generations.

The State and Private Forestry Redesign team agreed on three national priorities that are long term in nature and will serve multiple functions, including communicate the conditions, threats and opportunities of the nation's forests and associated benefits, identify the desired outcomes and key strategies that will guide the investment of federal funds, and provide the framework for simplified program and budget structure. The three national priorities were also listed in the 2008 Farm Bill. The Oklahoma Forest Resource Strategy includes goals and strategies that will address our state's and nation's priorities. Listed below are the national priorities and objectives which will be discussed further throughout this strategy.

1. Conserve Working Forest Landscapes

Objectives:

- Identify and conserve high priority forest ecosystems and landscapes
- Actively and sustainably manage forests

Key Strategies should include:

- Forest products, woody biomass, and environmental services market development
- Tax policies, conservation easements, county planning tools
- Facilitating other social and economic incentives to encourage retention of important forest landscapes. Technical assistance to communities and landowners on various techniques available to maintain healthy forests will be an essential supporting activity.

Desired Outcomes (Actions):

- Reducing the rate of conversion of forested landscapes to other uses
- Informing decisions about which landscapes should be conserved as working forests to optimize public benefits for current and future generations

2. Protect Forests from Harm

Objectives:

- Restore fire-adapted lands and reduce risk of wildfire impacts
- Identify, manage, and reduce threats to forest and ecosystem health

Key Strategies should include:

- Restoration of fire adapted forests
- Monitoring, assessment, and treatment of forest insect and disease pathogens
- Prevention, early detection, and rapid response to eradicate or control invasive species (An ongoing national inventory and assessment of forest conditions and technical assistance would be essential supporting activities.)

Desired Outcomes (Actions) - Reduce threats to and restore forest health and productivity associated with:

- Uncharacteristic wildfire
- Insects and disease
- Invasive species

3. Enhance Public Benefits from Trees and Forests

Objectives:

- Protect and enhance water quality and quantity
- Improve air quality and conserve energy
- Assist communities in planning for and reducing wildfire risks
- Maintain and enhance the economic benefits and values of trees and forests
- Protect, conserve, and enhance wildlife and fish habitat
- Connect people to trees and forests, and engage them in environmental stewardship activities
- Manage and restore trees and forests to mitigate and adapt to global climate change

Key Strategies should include:

- Strategic use of trees and forests in urban environments
- Watershed planning
- Enhancing community fire protection capabilities
- Linking environmental health with community well being (Promoting environmental literacy and partnership building will be important supporting activities to increase public understanding of the benefits provided by trees and forests and build support for managing forests to secure those benefits)

Desired Outcomes (Actions):

- Enhancing the suite of public benefits associated with trees and forests such as: clean air and water, fish and wildlife habitat, open space, outdoor recreation opportunities, renewable materials (building materials, paper products, bio-energy, medicinal products), economic attributes (employment, reduced heating and cooling costs, enhanced property values, reduced water storage and treatment costs, reduced flood risk and impacts, reduced fire suppression costs and impacts) and climate change buffering
- Reducing the risk to communities from uncharacteristic wildfires

Oklahoma Forestry Services' Overview

Oklahoma Forestry Services' mission is to conserve, enhance and protect the forest resources of Oklahoma for present and future generations. There are numerous programs and partnerships needed for Oklahoma Forestry Services (OFS) to be able to fully deliver its mission. This section of the strategy gives an overview of OFS' purpose and responsibilities.

State Forester Responsibility

The Director of Oklahoma Forestry Services is the State Forester, equivalent to the State Forester in all 50 states. In each state, the State Forester is recognized as the lead forester for all activities on state and private forestland. Through federal cooperative agreement and state statute, State Foresters assume responsibilities in managing and protecting the State's forest resources in close cooperation with other federal and state agencies, forest industry, private landowners, communities, educational institutions, groups and the public at large.

Oklahoma Forestry Services works in concert with the USDA Forest Service to deliver a wide variety of federal cooperative programs to the state's landowners and citizens. Under federal law and cooperative agreement, State Foresters are the delivery arm of federal forestry programs administered by the Forest Service in both resource protection and resource management on state and private lands.

Program Foundations

Oklahoma Forestry Services activities and responsibilities are dictated by a wide variety of federal and state laws, cooperative agreements and program directives. The Oklahoma Forestry Code, codified as O.S. Title 2, Article 16, guides the delivery of all forestry division services in the State. In addition, as explained below, the State Forester is the formal delivery mechanism for federal forestry programs in a cooperative partnership with the United States Department of Agriculture Forest Service.

Federal Partnership

Many federal laws have established cooperative forestry programs since the early 1920s. The Cooperative Forestry Assistance Act of 1978, as amended by the 1990, 2002 and 2008 Farm Bills, and other federal conservation legislation, establishes much of the basis for the state/federal forestry partnership. It is extremely important to understand this relationship.

> ***Under federal law and cooperative agreement, State Foresters are the technical delivery arm of federal forestry programs administered on state and private forestlands by the Forest Service.***

Simply stated, when Congress assigns the Secretary of Agriculture federal forestry program responsibilities on America's private forestlands, the USDA Forest Service develops the program in partnership with the 50 State Foresters and the National Association of State Foresters. On-the-ground forestry assistance provided to recipients of federal programs is handled by the State Foresters, not by federal USDA Forest Service employees.

In the 2008 Farm Bill, the role of USDA Natural Resource Conservation Service (NRCS) in forestry assistance was increased through expansion of their existing landowner assistance programs. In September 2008 an agreement at the national level between the USDA Forest Service, the NRCS, the National Association of State Foresters (NASF) and the National Association of Conservation Districts (NACD) established that "**State forestry agencies have the primary leadership role and responsibility for delivery of forestry programs on State and private lands**" in the United States, including USDA Forest Service Cooperative programs and NRCS programs.

Oklahoma Forestry Services maintains its relationship with the USDA Forest Service Cooperative programs. In addition, the State Forester and NRCS have an agreement in place whereby the State Forester provides forestry assistance under the federal EQIP, WRP, and HFRP programs. This expansion of NRCS programs resulted in dramatically higher levels of reforestation, afforestation and timber stand improvement over previous years. Oklahoma has more Indian tribal governments than any state in the U.S. The U.S. Department of Interior, Bureau of Indian Affairs (BIA) has an extensive presence in Oklahoma as a result of its trust responsibilities for all Tribal and allotted lands. Oklahoma Forestry Services has had an agreement in place with the BIA for many years addressing its partnership in providing fire protection on such ownerships in eastern Oklahoma. This agreement addresses all aspects of fire

protection including fire use, suppression, detection, prevention, preparedness, coordination, training, and information exchange.

The following statement is excerpted from the NASF report "Ecosystem Management on Non-Federal Lands." It captures the expected role and importance of State Foresters in meeting public expectations on forestland:

> ***Public expectations for forestlands transcend political, administrative, jurisdictional and ownership boundaries. Consequently, the public has many of the same expectations for non-federal lands as they do for federal lands. Non-federal forestlands comprise a significant majority of the forested land base of the United States. These lands have played a major role in meeting society's needs and will have an increasingly important role in the future. State forestry agencies and the technical services they provide are an essential part of the organizational structure that will respond to meet these needs.***

State Forestry Programs

Oklahoma Forestry Services' programs generally fall under one of four major deliverables: Management, Protection, Education and Support. In the following section, an introductory paragraph on the deliverable is followed by program areas with brief descriptions of each state level program and its supporting programs. The descriptions include a summary of the program's purpose and its target audience. The numerous programs and services OFS manages and provides will help address the six strategic issues identified in the Oklahoma Forest Resource Assessment and later discussed in this Forest Resource Strategy.

Deliverable: Forest Resource Management

Oklahoma's diversity, in both rural and urban areas, poses special challenges and opportunities to use trees and forests to improve the economy, mitigate environmental problems and improve the quality of life of our citizens. Professional foresters are needed to assist Oklahomans with wildlife habitat improvement, windbreak establishment and renovation, erosion control, water quality protection, watershed improvement, urban and community forestry, generation of income through forest products, creation or expansion of businesses, forest recreation and many other areas.

Oklahoma Forestry Services strives to deliver programs and resources to Oklahomans to help manage the forest resources. OFS utilizes a variety of programs to support landowners in managing their forestlands. Much of this assistance is provided through a partnership on the federal level with the USDA Forest Service. The major program areas include forest regeneration, state and private forestry assistance, forest product utilization and marketing, forestland conservation, urban and community forestry and management financial assistance.

Program Area: Forest Regeneration

Oklahoma's diverse climate, topography and soils demand high quality, locally adapted planting stock to be successful. Seed used in the production of these seedlings must be from sources collected locally, genetically improved or otherwise known to be adapted to our extremes of temperature and precipitation. The Forest Regeneration Center and the Forest Tree Improvement Center, managed by OFS, provide excellent seedlings for an array of forest conservation projects in Oklahoma.

Program: Forest Regeneration Center (FRC)

Purpose and Description: The Forest Regeneration Center is one of the oldest environmental programs in Oklahoma, established in 1926 in Stillwater. OFS currently operates the Forest Regeneration Center at a 120-acre site south of Norman at Goldsby. Over the past six years, the FRC has delivered over 4 million seedlings annually for timber production and environmental enhancement plantings. Over 30 species of trees and shrubs are grown and distributed to landowners to meet their objectives for windbreaks, wildlife habitat, timber production, erosion control and other conservation purposes.

Most of the seed used in the program is collected in Oklahoma from known sources to assure its adaptation to our planting conditions. A small number of containerized seedlings are grown for planting on harsh sites to increase survivability. The FRC also grows loblolly containerized seedlings to potentially replace some of the bare-root seedling stock used for reforestation. All requests for ornamental plantings are referred to the private sector.

The Forest Regeneration Center not only provides quality seedlings, it also emphasizes new research and education. Some of the research projects over the past few years highlight seedling quality, phyto-remediation, seed source viability and cultural practices to lower production cost while maintaining seedling quality. In certain circumstances, trees can absorb or mitigate pollutants, such as heavy metals, excess nutrients and other contaminants (phyto-remediation). The Regeneration Center team also spends time on educating the public through tours of the facility as well as tree planting demonstrations and seedling survival studies.

Target Audience: All landowners, including local, state and federal agencies, groups and individuals needing tree and shrub plant materials for conservation purposes may order seedlings.

Program: Forest Tree Improvement Center (FTIC)

Purpose and Description: Oklahoma Forestry Services operates the State's Forest Tree Improvement Center, which is located on OSU's Kiamichi Forest Research Station near Idabel, Oklahoma. Its purpose is to develop genetically improved seed for the production of high quality planting stock for Oklahoma landowners. Approximately 60 acres are planted in superior loblolly and shortleaf pine. Cones are collected each autumn, and the seed produced is used by the Forest Regeneration Center to grow improved seedlings for use by private landowners.

Genetic pine improvement thus far ranges from 15 to 53 percent on the various orchards. To adequately insure that high performance standards are met, OFS has remained an active member of the Western Gulf Forest Tree Improvement Program (WGFTIP) Cooperative which helps our staff carry on this program at a fraction of the cost and gives us access to forest geneticists not available otherwise.

In addition to providing genetically improved seedlings, the FTIC also maintains a hardwood seed orchard for bur oak, baldcypress and sawtooth oak seed collection, is conducting the Great Plains Ponderosa Pine research project and also grows and researches Christmas tree species.

Target Audience: The direct beneficiary of the activities of the Forest Tree Improvement Center is the State's Forest Regeneration Center. Ultimately, all landowners planting genetically improved trees benefit. Through our membership in the Western Gulf Cooperative, other Co-op members also benefit from our program, as we do from theirs, through the sharing of genetic material and expertise.

Program Area: State and Private Forestry Assistance

The State of Oklahoma owns tens of thousands of acres of forested lands which are held by various state agencies. OFS is responsible for the management of those lands. Approximately ninety percent of Oklahoma's forestlands are privately owned, with the majority being owned by small, non-industrial owners. At present, there are only a small number of private forestry consultants who work with landowners, and these are concentrated in eastern Oklahoma.

Whether it is a private landowner or another state agency, OFS forester's help landowners manage their land to meet a variety of objectives and provide technical forestry advice on tree planting, wildlife habitat improvement, forest recreation, erosion control and other forest-related land management. Specific activities include on-the-ground reconnaissance, evaluation of forest resources, forest inventory, preparation of written forest management plans, distribution of technical information, assistance in harvesting and marketing of timber and forest products, and assisting landowners in finding vendors or private consultants.

Some programs that help the foresters provide technical assistance are.

Program: Forest Stewardship

Purpose and Description: The Forest Stewardship Program provides assistance to owners of forest land and other lands where good stewardship, including agroforestry applications, will enhance and sustain the long term productivity of multiple forest resources. Special attention is given to landowners in important forest resource areas and those new to, or in the early stages of managing their land in a way that embodies multi-resource stewardship principles.

The State Forest Stewardship Coordinating Committee helps guide the program in cooperation with the State Forester. A Forest Stewardship Management Plan is prepared for landowners who request assistance. Landowners with an approved Forest Stewardship Plan are eligible for a variety of federal, state and private cost-share/grant programs to help implement specific practices prescribed in the plan. Forest Stewards who implement their plans receive recognition from the State Forester.

The program provides landowners with the professional planning and technical assistance they need to keep their land in a productive and healthy condition. The planning assistance offered through the Forest Stewardship Program may also provide landowners with enhanced access to other USDA conservation programs and/or forest certification programs. Below is a map that depicts priority areas where the Forest Stewardship Program will be focused.

The Forest Stewardship Program is authorized by the Cooperative Forestry Assistance Act of 1978, as amended, 16 U.S.C. 2103A.

Target Audience: Oklahoma's private, non-industrial landowners are the primary audience for the program. To be eligible for Forest Stewardship, landowners must enroll all their lands, and the lands must be at least 25 percent forested or to be converted to forest through tree planting.

Program: Public Lands Management

Purpose and Description: Oklahoma Forestry Services is partially responsible for all forest management activities conducted on state-owned forestlands. This includes those lands under the jurisdiction of other state agencies including Oklahoma Department of Wildlife Conservation, State Department of Tourism and Recreation and the School Lands Commission. OFS also provides technical forest management assistance on lands owned by local governments and the administration of the state's forest land conservation programs.

Target Audience: State agencies.

Program: American Tree Farm System (ATFS)

Purpose and Description: Tree Farms are more than pine plantations or Christmas tree farms. Tree Farms are varied in nature and contain many different habitats and stages of forest regeneration, from seedlings to mature timber. Biodiversity is a critical component of a certified Tree Farm. Tree Farmers must maintain natural forest buffers and other aspects of conservation techniques.

ATFS was established in response to concerns that America's private forests were being cut at unsustainable rates without reforestation. It all began in 1941 when the first Tree Farm was designated in Washington State. The Tree Farm's purpose was to demonstrate sound forest management practices to area landowners. The American Tree Farm System works to sustain forests, watersheds and healthy wildlife habitat through the power of private stewardship by offering affordable forest certification for family forest landowners in the United States.

ATFS has undergone many changes since its beginnings in 1941 and is now recognized internationally as a credible forest certification system. ATFS certifies landowners to the American Forest Foundation's Standards of Sustainability for Forest Certification to ensure markets remain open to Tree Farmer's wood, by undergoing third-party certification audits by independent, ANSI-ASQ National Accreditation Board (ANAB) accredited certification bodies.

ATFS has established standards and guidelines for property owners to meet to become a Certified Tree Farm. Under these standards and guidelines, private forest owners must develop a management plan based on strict environmental standards and pass an inspection by an ATFS trained forester every five years.

The American Forest Foundation (AFF) is a non-profit 501(C) (3) conservation and education organization that strives to ensure the sustainability of America's family forests for present and future generations.

Target Audience: Private landowners

Program Area: Forest Product Utilization and Marketing

Purpose and Description: Oklahoma's forest resources have the potential to contribute to the State's economy. There is ample opportunity for new or expanding forest industry firms. Underutilized forest resources, such as redcedar and central Oklahoma hardwoods, are untapped resources that can support sustainable economic development in rural communities and give landowners an economic incentive to manage and improve their forestlands. Developing technologies in biomass energy and biofuels using wood may help make the U.S. more energy self-sufficient.

OFS' forest utilization and marketing program offers Oklahoma's forest-resource based industries with technical support and information. Assistance is provided both existing businesses and potential businesses that have an interest in expanding, improving or developing the forest industry, or marketing forest products.

OFS maintains statistics on the state's forest resources, industry characteristics and the economic impact of forestry in Oklahoma. As time permits, Forestry helps develop and promote the growing eastern redcedar industry in central and western Oklahoma, and other wood product related opportunities.

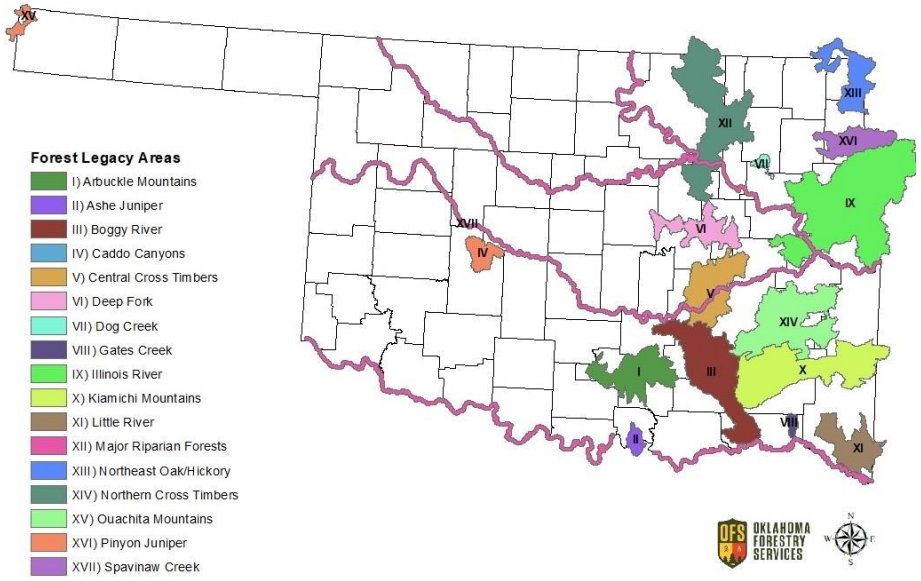
Target Audience: Forest-based industries wishing to develop or expand are the primary beneficiaries.

Program Area: Forestland Conservation

Forestlands make significant contributions to the natural and economic health of our state. Loss of forested acres and the fragmentation of the remaining acres reduce the potential of the forest to provide the economic, social and ecological benefits that we depend on. OFS works with several organizations including, The Nature Conservancy, Land Legacy, Inc., National Wild Turkey Federation and other non-governmental organizations, to conserve forestlands.

Program: Forest Legacy Program (FLP)

Purpose and Description: The Forest Legacy Program is a federally funded program to protect forestlands that provide exceptional values but which are threatened by development or conversion to non-forest uses. FLP is an entirely voluntary program. To maximize the public benefits it achieves, the program focuses on the acquisition of partial interests in privately owned forest lands identified in the assessment of need included as a part of the Oklahoma Forest Resource Assessment.



FLP helps the States develop and carry out their forest conservation plans. It encourages and supports acquisition of conservation easements, legally binding agreements transferring a negotiated set of property rights from one party to another, without removing the property from private ownership. Most FLP conservation easements restrict development, require sustainable forestry practices, and protect other values. Below is a map that depicts identified Forest Legacy Areas.

Target Audience: Legacy is directed toward owners of high-value working forests that may be threatened by development.

Program Area: Urban and Community Forestry

Purpose and Description: The Urban and Community Forestry Program provides technical advice to communities, homeowners, businesses, schools, groups, non-profit organizations and many others on managing the urban forest ecosystem. Healthy trees, forests and ecosystems in cities and towns provide for a safe, healthy quality of life for all Oklahomans and provide a multitude of benefits and services. At the local level, Division foresters provide technical assistance on a wide variety of projects. In the State Office, program specialists assist the foresters, provide technical assistance and when funding becomes available administer a competitive matching grant program for urban and community forestry program development. Forestry Services also administers the Tree City, Tree Campus, and Tree Line USA Programs of the National Arbor Day Foundation, and works with other state and national organizations to promote the positive impacts trees in communities provide.

In 1990, Forestry Services formed the Oklahoma Urban and Community Forestry Council. The Council is a statewide organization designed to promote the community forestry values, benefits and services trees,

woodlands and forests provide. Forestry Services and the Council sponsor an annual conference and jointly sponsor other activities.

Program: Urban and Community Forestry Assistance

Purpose and Description: Specific technical activities include tree assessments, inventories and analysis, master planning, species selection, tree health, planting and maintenance information and training. Individuals generally seek information or assistance on tree care, planting recommendations, assessment of construction damage or insect and disease related health problems. On occasion limited federal grant funds are available to assist communities with program development and education projects.

Target Audience: Our partners include Oklahoma cities and towns, homeowners, businesses, schools, groups, non-profit organizations and many others interested in or working to improve the urban & community forest resource. The agency has a strong network of partnerships throughout the state as a result of grant projects and Urban and Community Forestry Council activities.

Program Area: Management Financial Assistance

Oklahoma Forestry Services in partnership with many organizations provides financial assistance to landowners and communities implementing forestry practices. Most of the cost-share and grants available to landowners and communities are only provided for a limited amount of time and to specific locations around the state depending on program or project focus.

Program: Forest Resources Development Program

Purpose and Description: Forestry Services administers the Forest Resources Development Program (FRDP), a state-level forestry cost-share program. FRDP enables Forestry Services to administer state funds, donations and federal funds. Forestry also provides the technical forestry assistance to cooperators applying for financial assistance from other federal cost-share programs that involve forestry practices, such as the Conservation Reserve Program (CRP).

Target Audience: Oklahoma's private, non-industrial landowners applying for funding assistance.

Program: Natural Disaster Recovery Grants

Purpose and Description: When federal funding is secured following catastrophic events Oklahoma Forestry Services, in cooperation with the USDA Forest Service, offers assistance to communities recovering from these severe ice storms.

Funds are available on a competitive cost-share basis to assist state and local governments, approved non-profit organizations, educational institutions, and community tree volunteer groups with the recovery efforts such as tree health assessments, hazard tree mitigation, and replanting efforts.

Target Audience: State agencies, cities, towns, universities, state and non-profit entities that have public education responsibilities and/or entities with public lands within the scope of their care and responsibilities.

Program: Urban and Community Forestry Grants

Purpose and Description: Through Oklahoma Forestry Services and the Urban and Community Forestry Council, federal funds are administered for urban forestry activities that support, promote and enhance local community forestry programs. The intent of the Urban and Community Forestry Assistance Program is to enable local communities to effectively manage and improve their community forest and to fully realize the value and services trees provide throughout Oklahoma's, cities, towns, communities and public lands.

Target Audience: State agencies, cities, towns, universities, state and non-profit entities that have public education responsibilities and/or entities with public lands within the scope of care and responsibilities.

Program: Tree Cycler Program

Purpose and Description: This is an initiative to expand all reforestation on recently harvested land or on lands being converted to forests throughout Oklahoma. The program is funded by Tree Cycler, to provide free conservation seedlings to qualified landowners.

Target Audience: Private non-industrial landowners

Program: Trees for Oklahoma Program

Purpose and Description: This is an initiative to expand pine reforestation on recently harvested land or on lands being converted to forests in southeast Oklahoma. The program is funded by Huber Engineered Woods LLC of Broken Bow, Oklahoma, to provided free seedlings to qualified landowners.

Target Audience: Private non-industrial landowners.

Program: Environmental Quality Incentives Program (NRCS)

Purpose and Description: This project provides landowners with financial and technical assistance to improve or establish forestland in southeastern Oklahoma. Only private, non-industrial forestland within the Local Emphasis Areas (LEAs) is eligible. Through a cooperative agreement, OFS foresters provide direct technical assistance to landowners. Financial assistance will be provided through EQIP to establish and improve forests on lands with a site index of 50 or more.

Environmental benefits will include carbon sequestration, sediment reduction, and improvements in the quantity and quality of forest products. Other benefits include opportunities for local land users to implement best management practices in an affordable manner.

Target Audience: Landowners in the Local Emphasis Areas

Deliverable: Forest Resource Protection

Oklahoma Forestry Services strives to protect the State's forest resources from numerous threatening factors. OFS supports landowners with protecting their forest resources with several program areas including water quality protection, rural fire protection and defense, forest health and protection financial assistance.

Wildfires cause considerable damage to Oklahoma's natural resources each year. Because forest management is such a long-term investment, many landowners hesitate to improve their forestlands due to the threat of wildfire. Woods arson remains a problem in some areas and timber theft is common, especially when timber prices are high. As more people move to the fringe of cities or into rural areas, the "values at risk" increase considerably for fire protection forces.

Across the state, over 900 rural fire departments help protect communities, rural homes and natural resources from fire. Rural fire protection is one key to rural economic development, yet many small departments are poorly equipped, inadequately trained and under-funded.

Insect and disease problems are common in Oklahoma's rural and urban forests, although only a few species cause severe economic damage. The southern pine beetle remains the largest threat to the southern pine region, with populations generally endemic and only occasionally erupting and causing severe damage. Oklahoma's forests are also susceptible to gypsy moth attack, and isolated spots have been detected as close as northern Arkansas.

Program Area: Forest Water Quality Management and Protection

Purpose and Description: Program efforts strive to minimize the impact of forestry activities on water quality, as well as to use forestry practices, such as tree planting, to help solve water related problems. OFS is charged by statute with administration of the state's forest water quality management program, including development of forestry best management practices. Technical assistance is provided to forest landowners to plan and encourage implementation of proper forestry practices to minimize soil erosion and protect water quality, especially for road construction and maintenance. Statewide planning and an active education program for loggers, land managers and the public, has helped make people aware of the need for water quality protection.

Oklahoma's forest water quality program is non-regulatory and relies on industry and landowner cooperation to protect water quality during forestry activities. Raising the awareness of various audiences within the forestry community is essential to program success. Working cooperatively with the State

Extension Forester, Oklahoma Forestry Association and the Arkansas Timber Producers Association, we conduct logger and landowner BMP workshops and develop educational materials. Contractor "tailgate" sessions are held on logging sites where BMP needs can be addressed most effectively. Demonstration sites are used in educational activities where loggers and landowners can learn about forest road BMPs, or agricultural producers observe low-cost gully control treatments using trees. Complaints are investigated and resolved as necessary to address legitimate water quality impacts from forestry activities.

Program: BMP Compliance Monitoring

Purpose and Description: Forestry Services monitors the compliance with Oklahoma's Forestry Best Management Practices using a protocol established by the Southern Group of State Foresters. Monitored sites are selected randomly from a large pool of tracts that have received treatment within the past two years. Our water quality forester uses the BMP Checklist to determine the extent to which the BMPs were followed, and to identify significant risks to water quality that need follow-up action. Observations on each site are shared with the landowner, land manager and contractors as an educational tool to improve overall BMP performance and help assure that Oklahoma's water resources are protected. The most recent monitoring project was completed in February 2010.

Target Audience: Loggers, landowners, land managers, mill owners and the general public benefit from the program

Program Area: Rural Fire Protection

Purpose and Description: Forestry Services is responsible for wildland fire protection throughout the State of Oklahoma's approximately 44 million acres. Forestry Services' firefighting resources are frequently requested to travel across the State to provide suppression assistance on large, complex wildfires which tax the local jurisdiction's ability to manage. As land management practices change over time, requests for suppression assistance from outside of the Protection Area are anticipated to increase.

While responsible for fire protection statewide, the Forestry Services' firefighting resources are concentrated in a 6.2 million acre Initial Attack Area which covers all or parts of 15 counties in eastern Oklahoma. This Initial Attack Area is formally designated by the State Forester, based upon identified needs and available Forestry Services firefighting resources. Active fire detection utilizing aircraft and fire towers coupled with the rapid response by two-person fire crews with firefighting equipment minimize the damage to property and natural resources.

Fire prevention and law enforcement activities in arson and timber theft investigation by Oklahoma Department of Agriculture, Food and Forestry (ODAFF) special officers contribute to a balanced protection program. Landowners within OFS' Initial Attack Area are required to notify Forestry Services when planning or initiating a prescribed burn or burning debris. For the past five years, OFS forces have responded to over 9,000 wildfires that totaled approximately 750,000 acres. These fire suppression efforts have saved over 8,000 structures with a value of approximately 275 million dollars. Due to data limitations, the above statistics only include a small number of the actual fires that have occurred in Oklahoma.

OFS works with the National Weather Service to deliver Oklahoma's Red Flag Warning program to advise residents of extreme fire weather conditions that require extra caution to prevent wildfires. The State Forester is also responsible for monitoring county-level burn bans and advising the Governor when a more stringent outdoor burning ban is appropriate. OFS also has developed Voluntary Smoke Management Guidelines designed to reduce or prevent negative smoke impacts resulting from prescribed burning.

In addition to fire suppression and prevention responsibilities, OFS administers several National Fire Plan Grants which provide financial support for improved fire protection across Oklahoma. These National Fire Plan grants are utilized, but not limited, for the funding of hazard mitigation projects, equipment purchases, promotion of Firewise Communities and the development of Community Wildfire Protection Plans.

Target Audience: The OFS Fire Protection program serves Oklahoma's population of approximately 3.7 million residents, including all federal, state and private landowners. Cooperative agreements with Oklahoma's approximately 900 Fire Departments, the USDA Forest Service, and the USDOI Bureau of Indian Affairs are also used to support fire protection across Oklahoma.

Program: Firewise

Purpose and Description: Oklahoma Forestry Services with the help of an independent contractor provides technical and financial assistance to implement the national Firewise program. This program is a multi-agency effort designed to reach beyond the fire service by involving homeowners, community leaders, planners, developers, and others in the effort to protect people, property, and natural resources from the risk of wildland fire - before a fire starts. The Firewise Communities approach emphasizes community responsibility for planning in the design of a safe community as well as effective emergency response, and individual responsibility for safer home construction and design, landscaping, and maintenance.

Target Audience: Fire Departments, communities, cities, towns, and individuals

Program Area: Rural Fire Defense

Purpose and Description: The Rural Fire Defense Program (RFDP) offers broad assistance to Oklahoma's approximately 900 rural fire departments to improve local fire protection services. Under an agreement with the U.S. Forest Service, the RFDP acquires federal excess property that is placed with fire departments for their use for fire protection purposes only. Rural Fire Coordinators, under contract to Oklahoma Forestry Services, provide planning and technical assistance to fire departments in eleven rural fire coordination districts (departments within the Association of Central Oklahoma Governments are served directly by Forestry Services).

Financial assistance is also offered to fire departments through federal and state funded grants. These grants include fire hydrant program, state funded 80/20 grants and federally funded 50/50 grants for training and equipment (See Financial Assistance Program Area). Fire departments may purchase firefighting supplies, such as hose, nozzles and protective clothing, through Forestry Services' revolving fund program. The RFDP administers competitive matching grant programs as well.

Well organized and equipped fire departments help lower a community's insurance risk rating, saving considerable sums in premiums for residents and businesses.

Target Audience: Title 18 rural fire departments, Title 19 fire districts and municipal fire departments are the primary beneficiaries. OFS has formal cooperative agreements with more than 900 fire departments in all of Oklahoma's seventy-seven counties. Each of these departments receives some form of assistance annually.

Program Area: Forest Health

Purpose and Description: The Forest Health Program is a cooperative program with the USDA Forest Service to assist in maintaining the health of Oklahoma's forests. Forestry Services monitors forest pest conditions statewide, with emphasis on the southern pine beetle. We also cooperate with Animal and Plant Health Inspection Service (APHIS) on special surveys, primarily for gypsy moth. OFS provides pest diagnosis and control recommendations and resource management information to homeowners and landowners to help protect their forests and trees. The USDA Forest Service has initiated a formal Forest Health Monitoring Program in some states, but we are not yet participating.

Target Audience: State and private forest landowners are the primary audience, urban homeowners receive pest assistance on a very limited basis.

Program: Southern Pine Beetle Prevention Program

Purpose and Description: The southern pine beetle (SPB) is a major threat to the pine forests of Oklahoma and the southern United States. This cooperative program with the USDA Forest Service encourages landowners to implement practices which reduce the susceptibility of Oklahoma's forests to

future SPB outbreaks. Limited financial assistance is available through the FRDP for thinning practices that improve the health of dense stands.

Target Audience: Forest landowners

Program Area: Protection Financial Assistance

Oklahoma Forestry Services in partnership with many organizations provides financial assistance to landowners and communities implementing practices to protect forest resources. Most of the cost-share and grants available to landowners and communities are only provided for a limited amount of time and to specific locations around the state depending on program or project focus.

Program: Community Wildfire Protection Plan Grants

Purpose and Description: This program provides grants for development of a Community Wildfire Protection Plan. These plans help local governments identify wildfire risks, educate the residents and develop contingency plan for protection.

Target Audience: Communities, cities, towns, fire departments

Program: Rural Fire Operational Grants

Purpose and Description: State-funded 100-percent operational grants are annually awarded to eligible fire departments, based upon legislative appropriations.

Target Audience: Fire departments statewide

Program: Rural Fire 80/20 Matching Grants

Purpose and Description: State-funded 80/20 grants may be used for construction or improvement of fire stations or for equipment purchase. Funds are competitive.

Target Audience: Fire departments statewide

Program: Dry/wet Fire Hydrants

Purpose and Description: When funds are appropriated, the RFDP administers a state-funded dry/wet fire hydrant program. Through this program the Rural Fire Coordinators place hydrant supplies with fire departments for local installation. These hydrants are often installed in cooperation with County Commissioners and Conservation Districts.

Target Audience: County Commissioners and Conservation Districts, fire departments

Program: Volunteer Fire Assistance Grants

Purpose and Description: Federally-funded 50/50 grants are awarded for training and equipment under the Volunteer Fire Assistance Program.

Target Audience: Rural and community fire departments under 10,000 population

Deliverable: Forest Resource Education

Oklahoma Forestry Services strives to educate Oklahomans about our state's forest resources and associated benefits. Providing excellent education to the public requires that Oklahoma's foresters, educators and natural resource professionals are knowledgeable about Oklahoma's forest resources and the issues threatening them. Therefore OFS provides continuing education opportunities for internal employees as well as provides educational programs to natural resource professionals, students and the public. The three major program areas utilized to provide forest resource education to the state includes environmental education, the Forest Heritage Center and education financial assistance.

Program Area: Environmental Education

Purpose and Description: Education of Oklahoma citizens about forestry and natural resource issues has been a critical component of Forestry Services' programs since its creation in 1925. A knowledgeable citizenry makes informed decisions about the use, management and protection of its resources. Every OFS employee is involved in some form of public education activity during the course of each year, whether developing and implementing formal programs described below, or presenting workshops or school programs, appearing in parades, playing Smokey Bear or Tree Bear, developing exhibits, writing news articles or providing information to the public.

Project Learning Tree (PLT), a national environmental education program, is cosponsored by Oklahoma Forestry Services and the Oklahoma Forestry Association and utilized to educate students statewide about forest and natural resources. The goal of the program is to teach students how to think, not what to think. Nearly every Oklahoman is affected by or benefits from our forests. It is important that Oklahomans understand these benefits, the consequences of our actions and how we can help.

Target Audience: Natural resource professionals, in-service and preservice educators, youth leaders, Oklahoma landowners and citizens, visitors and tourists

Program Area: Forest Heritage Center

Purpose and Description: The Forest Heritage Center (FHC) is a cooperative effort with the State Department of Tourism and Recreation and the Forest Heritage Center Advisory Board. Located in Beavers Bend State Park north of Broken Bow, the Center serves as forestry museum, conference center and educational facility. Forestry Services develops and administers the forestry educational and interpretive program at the Center through its Program Director. Specific activities include presentation of tours, development and maintenance of exhibits, coordination of items on loan or donated for display, preparation of a quarterly newsletter, development of special exhibits and events and other activities.

The Center features a series of 14 large-scale diorama paintings and display cases by Atlanta artist Harry Rossoll, illustrator of Smokey Bear. These cases portray the history of the forest and its development from prehistoric times to the present. The FHC is the home of Tree Bear©, a mascot and spokesman for the good things that come from trees. Forestry Services, in cooperation with the FHC Advisory Board, completed a People of the Forest photographic exhibit that portrays the important role of Dierks Forests, the traveling timber towns and the Civilian Conservation Corps in the history of the state's forests.

A youth environmental education program under the FHC Advisory Board and coordinated by OFS is the Forestry and Wildlife Youth Camp which provides students, ages 13-15, with the opportunity to experience forestry and wildlife professions, learn about Oklahoma's natural resources and build an awareness of environmental components and issues.

Target Audience: The primary audience includes visitors to Beavers Bend State Park, tour groups such as organizations and schools who schedule a tour of the Center, and professional groups and agencies using the Center's meeting facilities, camp participants.

Program Area: Education Financial Assistance

Oklahoma Forestry Services in partnership with many organizations provides financial assistance to individuals and organizations for the purpose of increasing the understanding our state's natural resources. Most of the cost-share and pass thru grants are only provided for a limited amount of time and to specific locations around the state depending on program or project focus.

Target Audience: Universities, public schools, non-profit organizations, state agencies, etc.

Deliverable: Forest Resource Support

Oklahoma Forestry Services strives to provide high quality, ecologically sound assistance in keeping with our mission to conserve, enhance and protect Oklahoma's forestlands. This requires more than just direct technical assistance. This includes a variety of programs that help provide safety and training, forest resource planning, data regarding the volume and conditions of our forested lands and information services.

Program Area: Communications and Outreach

Purpose and Description: The OFS Communications & Outreach Group tells its story – who we are, what we do and services we provide - to the general public, as well as targeted groups such as children and teens, land owners, fire and emergency personnel, and the 13,000 people who visit the Forest Heritage Center Museum each year.

The Communications & Outreach Group includes a communications manager, a part-time public information officer, an education coordinator and two Forest Heritage Center staff. Together, this group strives to provide consistent, deliberate messaging and branding to its external and internal audiences to create awareness about OFS and its services and further OFS objectives.

Communications utilizes multiple tools to reach the general public, as well as targeted markets for specific messages. For general audiences, communications utilizes its website, news releases and facilitates media interview opportunities. For messages targeted to specific groups, they utilize email blasts. For example, they are able to send messages to fire departments, seedling buyers/land owners, natural resource educators and others. Social media provides a means for sharing information quickly and creating audience engagement. More than 50,000 people follow the OFS Facebook page and it is especially active when wildfires are burning in the state because followers are looking for real-time information. OFS employees are encouraged to submit to and follow the page to see what their co-workers are doing and stay informed. Communications also makes a point to send out news releases, board reports and other information to all employees in an effort to improve internal communications.

A public information officer who is specifically trained in the incident management system is also part of the Communications and Outreach group. While trained for any incident management assignment, this person is primarily utilized for public information duties during large wildfires and special communications projects.

The education coordinator provides programing and curriculum for teachers, presents programs and learning activities for children and teens, coordinates the state's Project Learning Tree program and directs a week-long Youth Forestry Camp every summer. She additionally strives to meet internal needs for educational programs by creating programs that can easily be used by others. The education coordinator maintains the education portion of the OFS website and also utilizes social media to educate and create awareness. Communications and education work together to create forestry displays and activities for events.

The Forest Heritage Center Museum, located in far southeastern Oklahoma, exists to educate people about the history and current state of forestry and the timber industry in the state. The museum is run through a unique partnership, with OFS providing the staff, Oklahoma Tourism & Recreation Department maintaining the building and a not-for-profit board overseeing exhibits and artwork. Working together, these organizations provide a place for visitors to see and hear historic and current information about forestry, wood products and the timber industry in Oklahoma. The museum hosts multiple art exhibits, woodturning events and a folk festival that draws approximately 15,000 thousand attendees every year. Additionally, the museum provides tours for schools and other groups and hosts a week long summer day camp for children. The museum is excellent conduit for increasing awareness and telling the story of OFS, its history and services. Working together, the Communications and Outreach Group makes a stronger impact and helps to maintain consistent messaging and branding for OFS.

Target Audience: Individuals, groups, agencies and others with a need to know about trees and forests and related information

Program Area: Safety and Training

Purpose and Description: The safety and training efforts of OFS are not based in any one program or staff person, but are presently incorporated in all programs and services. However, there is an active safety program at the Area level. A full-time Safety Coordinator provides numerous in-house training opportunities, such as Defensive Driving, CPR, ROHVA and First Aid. The Safety Coordinator also conducts inspections of Forestry Services facilities to ensure compliance with Department of Labor safety standards.

The Forestry Services Incident Qualifications Committee, formed in 2003, is responsible for administering employee incident qualifications and training records. The Qualifications Committee meets quarterly to approve completed Position Task Books, document employee incident experience, and to schedule National Wildfire Coordinating Group training courses. The safety and training program is targeted to improve employee job performance through enhanced knowledge, skills and abilities which has a direct correlation with reducing on-the-job accidents.

Target Audience: OFS employees benefit from safety and training activities.

Program Area: Professional Development

An important component to providing education and information to Oklahoma's citizens is insuring that natural resource professionals have the proper tools and knowledge. Forestry Services' utilizes many training programs and information to enhance the knowledge and understanding of foresters and other personnel on Oklahoma's forest resources, customer needs and programs and tools needed to implement forest management practices.

An example of professional development training undertaken by OFS is the USDA Forest Service Changing Roles Program. This program provides state and federal natural resource agencies with a set of flexible resources to conduct their own training programs, aimed toward building skills and tools to successfully tackle wildland urban issues.

Target Audience: Natural resource professionals and others providing technical assistance to Oklahoma landowners

Program Area: Forest Resource Planning and Policy

Purpose and Description: Planning encompasses the OFS long-range organization and program management efforts, including the State Forest Resource Assessment and development of issues, public input processes and annual work plans. Program planning is inclusive in all OFS programs, and Forest Resource Planning is rarely considered a separate program. The long-term nature of the forest resource increases the importance of strategic planning activities, yet limited staff often reduces the time devoted to planning. One part of forest resource planning includes data collection, analysis and display which are conducted using a Geographic Information System (GIS). GIS applications are tools that allow OFS' personnel to analyze spatial information, edit data, display maps and present results.

Target Audience: All OFS employees participate in the annual work planning process. Key staff develops more specialized resource planning projects. The ultimate beneficiaries of quality strategic and long-range planning are the customers of Forestry Services.

Program Area: Forest Inventory and Analysis (FIA)

Purpose and Description: The Forest Inventory and Analysis Program is a partnership between Oklahoma Forestry Services and the USDA Forest Service. This program reports on the overall extent and condition of Oklahoma's forests using a continuous forest inventory process. Forest inventories have been conducted in eastern Oklahoma approximately every 7 to 10 years since 1936.

Inventory data is collected on a grid of permanent plots established about three miles apart. Crews use exacting procedures to take measurements on each plot that include species, size and condition of trees, evidence of harvesting, insects and diseases, fire or other forest impacts. Additional plots are evaluated for forest health purposes. The data is compiled and analyzed by the USDA Forest Service.

This process determines the status and trends of Oklahoma's (and the nation's) forested areas including forestland ownership patterns, forest location and extent, species composition, the size and health of trees; as well as removals by harvest, and losses to forest pests and other causes. This information is invaluable for planning and rural economic development purposes. It also enables us to evaluate whether current forest management practices are sustainable in the long run and to assess whether state policies will allow the next generation to enjoy Oklahoma's forests as we do today.

Oklahoma's FIA program expanded statewide in 2008, and now involves measuring 20% of the plot grid annually in eastern Oklahoma and 10% in central and western counties.

Target Audience: Oklahoma Forestry Services, Oklahoma forestland owners, Oklahoma forest industry

Partnerships

Oklahoma Forestry Services works with numerous public, private and non-governmental organization partners to provide a variety of programs, projects and assistance to deliver our mission to enhance, conserve and protect Oklahoma's forest resources. Many of the programs were discussed in the previous section but there is a multitude of projects and assistance OFS and partners provide to an array of groups that might not be included in this document. As the landscape and ownerships change over time so can the partnerships that OFS works with to manage Oklahoma's forest resources. In the strategic issue section of this document, most of the key partnerships are linked to the long-term strategies for each issue.

Strategic Issues and Priority Areas

The issues discussed in this section are the six issues that were identified in the Oklahoma Forest Resource Assessment. Oklahoma Forestry Services with the help of interested stakeholders has identified long-term strategies to address the major threats to the State's forest resources. In order for Oklahoma's State Forester to address these long-term strategies, there are necessary resources. These resources include the existing programs described in the previous section as well as special initiatives, essential partnerships and funding to continue to enhance, conserve and protect Oklahoma's Forest Resources.

Issue working groups analyzed the six issues and determined major goals and strategies to address the issues threatening Oklahoma's forests. For each issue, there are maps which depict the priority and focus areas. The priority area map illustrates areas that have been identified as high priority lands and the focus area map illustrates the highest priority counties where resources should be focused.

Issue: Forest Sustainability and Health

A healthy and sustainable forest is one that can maintain biodiversity, productivity, and regeneration capacity for present and future generations. Oklahoma's landscape is typically, and incorrectly, viewed as non-forested which has led to the loss of many forested areas. Much of what we know about the health and sustainability of Oklahoma's forests is derived from the USDA Forest Service's Forest Inventory and Analysis (FIA) Program. Concerns about the health and sustainability of Oklahoma's forests, although of a statewide nature, generally focuses more on eastern Oklahoma where reliable data has been collected for a long period of time, and where the majority of the State's productive forestlands and timber industry are located. Oklahoma's eastern forests have remained fairly stable over the past 50 years.

Even though from 1993 to 2008 overall forestland acreage in eastern Oklahoma had increased by more than 200,000 acres, there was still approximately 380,000 acres of forestland lost to non-forest uses, such as agriculture, urban development and rights of way (USDA-FS, FIA). As a whole, it appears that forest regeneration, either by natural or artificial means, is more than offsetting the losses to conversion. The data above are only accurate for eastern Oklahoma, and there may be cause for concern about conversion impacts in central and western Oklahoma. As indicated above, FIA plots are currently being surveyed for the entire state which could drastically change the total number of documented forested acres in Oklahoma.

Land-use changes, ecological pressures, economic issues, as well as landowner and societal influences are all threatening the health and sustainability of Oklahoma's forests. When the health and sustainability of Oklahoma's forests diminish, so do the associated benefits. A more detailed description of the Forest Sustainability and Health Issue can be found in the Oklahoma Forest Resource Assessment.

Goal 1: Increase the active management of Oklahoma forestlands to enhance and maintain their productivity, health and environmental benefits.

Objective 1.1: Ensure the sustainability, health and productivity of Oklahoma's forestlands by encouraging the proper use of forest management and improvement practices.

Strategy 1.1.1: Raise awareness among landowners and land users of the full suite of forest benefits and alternative practices that will maintain or enhance those benefits.

Strategy 1.1.2: Recognize landowners who practice good forestry and conservation on their lands.

Strategy 1.1.3: Increase the percentage of Oklahoma's priority forestlands that are managed under an approved forest management plan.

Strategy 1.1.4: Increase the amount of state-owned forestlands that are being appropriately managed and contributing to the state's overall environmental goals.

Strategy 1.1.5: Improve coordination with other natural resource agencies and organizations on forestry issues.

Strategy 1.1.6: Assure an adequate supply of quality seedlings for conservation efforts.

Strategy 1.1.7: Assure that professional foresters and natural resources professionals are trained and kept informed concerning forest pest threats and forest health issues in Oklahoma.

Objective 1.2: Increase awareness of sustainability issues pertaining to Oklahoma's forest resources.

Strategy 1.2.1: Raise the awareness of legislators, policymakers and key audiences of the contributions forests and trees make to Oklahoma.

Strategy 1.2.2: Use all aspects of information media to raise awareness of forestry and natural resource issues.

Strategy 1.2.3: Help young people gain an appreciation for forestry and the important role forests and trees play in their lives.

Strategy 1.2.4: Facilitate information exchange and coordinate state education efforts among interested groups on forestry issues.

Strategy 1.2.5: Increase awareness of fire ecology and the benefits of fire as a management tool.

Objective 1.3: Identify and mitigate the threats to Oklahoma's forest resources.

Strategy 1.3.1: Assess and monitor Oklahoma's forestlands for outbreaks of serious insect and disease infestations or forest health impacts and undertake control measures where warranted and feasible.

Strategy 1.3.2: Provide proven seed sources that are more resistant to insects and diseases, drought and other influences.

Strategy 1.3.3: Track the health and sustainability of Oklahoma's diverse forest resources over the long term to detect trends and rising issues.

Strategy 1.3.4: Provide information to the public about existing and potential threats to forest health.

Strategy 1.3.5: Enhance the state's prescribed burn program to restore fire to the landscape where appropriate.

Strategy 1.3.6: Evaluate current and predicted future forest conditions and their potential impact on forest management activities in Oklahoma.

Strategy 1.3.7: Assure that the OFS is prepared to address and adapt to potential forest resource changes caused by climate change.

Resources Necessary for State Forester to Address Strategies

(next page)

Oklahoma Forestry Services' Deliverables and Program Areas																																					
	Management						Protection					Education			Support				Partnerships																Farm Bill National Priorities		
Goals, Objectives, Strategies	Forest Regeneration	State and Private Forestry Assistance	Utilization and Marketing	Forestland Conservation	Urban and Community Forestry	Management Financial Assistance	Water Quality Protection and Management	Rural Fire Protection	Rural Fire Defense	Forest Health	Protection Financial Assistance	Environmental Education	Forest Heritage Center	Education Financial Assistance	Forest Resource Planning	Information Services and Communication	Safety and Training	Forest Inventory and Analysis	USDA Forest Service	Natural Resources Conservation Service	Farm Service Agency	Land Trust Organizations	Oklahoma State Parks	Oklahoma Department of Wildlife Conservation	US Fish and Wildlife Service	Oklahoma State University	Forest Industry	Bureau of Indian Affairs	Oklahoma Forestry Association	Oklahoma Urban and Community Forestry Council	Law Enforcement	Society of American Foresters	American Tree Farm System	National Wild Turkey Federation	Conserve Working Forest Landscapes	Protect Forests from Harm	Enhance Public Benefits from Trees and Forestts
Issue: Forest Sustainability and Health																																					
Goal: Increase the active management of Oklahoma forestlands to enhance and maintain their productivity, health and environmental benefits.																																					
Objective 1.1: Ensure the sustainability, health and productivity of Oklahoma's forestlands by encouraging the proper use of forest management and improvement practices.																																					
Strategy 1.1.1	X	X			X		X	X		X		X	X			X	X		X	X			X	X					X	X							X
Strategy 1.1.2		X														X			X	X				X					X				X	X	X		X
Strategy 1.1.3	X	X	X	X	X	X	X												X	X		X	X	X		X			X	X		X		X	X	X	X
Strategy 1.1.4	X	X		X			X			X					X	X	X					X	X												X	X	X
Strategy 1.1.5	X	X			X		X	X		X					X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			X
Strategy 1.1.6	X	X														X			X	X				X		X	X								X		X
Strategy 1.1.7	X	X			X		X			X		X			X	X	X		X	X				X	X	X	X		X	X		X	X	X	X	X	X
Objective 1.2: Increase awareness of sustainability issues pertaining to Oklahoma's forest resources.																																					
Strategy 1.2.1		X			X			X		X		X	X		X	X	X	X	X								X		X	X		X			X	X	
Strategy 1.2.2		X			X			X		X		X	X		X	X		X	X	X						X			X	X		X			X	X	
Strategy 1.2.3		X			X							X	X	X		X			X	X		X	X	X	X	X	X		X	X			X	X	X	X	
Strategy 1.2.4												X	X			X			X	X						X			X	X					X	X	
Strategy 1.2.5		X		X		X	X			X	X	X	X	X	X	X	X		X	X		X		X		X			X			X		X	X	X	X
Objective 1.3: Identify and mitigate the threats to Oklahoma's forest resources.																																					
Strategy 1.3.1		X			X					X	X				X	X	X	X	X							X										X	
Strategy 1.3.2	X	X								X						X			X	X						X										X	
Strategy 1.3.3		X								X								X	X							X										X	
Strategy 1.3.4		X			X		X	X		X		X				X	X	X	X	X		X	X	X	X	X			X	X						X	
Strategy 1.3.5		X		X	X			X		X						X	X		X	X															X	X	X
Strategy 1.3.6	X	X		X	X		X			X		X			X	X		X	X	X						X			X			X			X		X
Strategy 1.3.7	X	X		X			X	X	X	X					X		X		X							X						X			X	X	X

Issue: Wildfire Risks to the Forest Resources

Wildfire is an issue throughout Oklahoma. The issues associated with wildfire are troublesome in that fire has many benefits when applied properly, but can have destructive consequences when left unchecked. Wildfires often cause economic damage to forestlands, endanger firefighters and threaten public safety and property. State and federal natural resource agencies expend a considerable amount of their annual budgets on wildfire suppression to prevent these unwanted consequences.

The improper or lack of land management practices in many parts of Oklahoma, coupled with the suppression of fire for nearly 100 years have allowed for significant accumulation of wildland fuels which contributes to wildfire severity. State and Federal agencies which suppress wildland fire also spend funds to introduce fire on the landscape under proper conditions for the benefit that fire has on native vegetative communities and to reduce the hazard present.

Furthermore, fire complexity has increased with population growth, especially within the wildland-urban interface where an increasing number of structures in rural areas continues to complicate the fire control and use picture. Oklahoma's history of severe weather and drought as well as the effects of climate change have increased the chances of more catastrophic wildfires and are affecting ecosystem functionality.

Since 2004, Oklahoma Forestry Services alone has responded to over 9,000 fires totaling approximately 750,000 acres statewide. These fire suppression efforts have saved over 8,000 structures with a value of approximately 275 million dollars. Due to data limitations, the above statistics only include a small number of the actual fires that have occurred in Oklahoma. A more detailed description of the Wildfire Risks to the Forest Resource Issue can be found in the Oklahoma Forest Resource Assessment.

In June of 2014, Oklahoma took a big step forward on this front with the roll-out of SouthWRAP (Southern Wildfire Risk Assessment Portal). The Southern Group of State Foresters worked jointly to develop a practical application that facilitates wildfire risk assessment which is targeted to prompt mitigation action by property owners, communities and agencies. Initially, SouthWRAP has proven beneficial and gaining an audience that is utilizing the program. The challenge lies in encouraging, supporting and taking actions that transfer the information to good practice on the ground

Goal 2: Reduce the risk of destructive wildfires to Oklahoma's natural resources and their threat to public safety.

Objective 2.1: Raise public awareness of wildfire issues in Oklahoma.

Strategy 2.1.1: Enhance and implement the wildfire prevention education program to increase knowledge of landowners, students and the public about Oklahoma's wildfire issues.

Strategy 2.1.2: Raise awareness of communities, fire departments and local citizens about issues and risks associated with the wildland-urban interface and hazardous fuel mitigation.

Strategy 2.1.3: Improve media understanding of the issues related to wildland fire and pursue their cooperation to inform the public of those issues.

Strategy 2.1.4: Improve communications with communities, stakeholders and citizens concerning fire danger and wildfire activity in the state.

Objective 2.2: Develop a cohesive structure among state, federal, local and tribal fire control organizations within the state to reduce the occurrence and harmful effects of wildfires.

Strategy 2.2.1: Serve as a member of the Oklahoma Interagency Coordinating Group with representatives from state, federal, local and tribal organizations.

Strategy 2.2.2: Promote and utilize joint training opportunities to ensure an efficient response and increase responder safety in everyday operations of Oklahoma's fire organizations.

Objective 2.3: Reduce the likelihood of devastating wildfires through the use of fire prevention, preparation and hazard mitigation practices.

Strategy 2.3.1: Promote the development of Community Wildfire Protection Plans to protect at-risk communities from damage caused by wildfires.

Strategy 2.3.2: Develop the means to implement Community Wildfire Protection Plans through funding and support for interface communities throughout the state.

Strategy 2.3.3: Identify Oklahoma's most fire prone areas and areas of highest risk of loss from wildfire in order to target efforts to reduce such risks and losses.

Strategy 2.3.4: Utilize fuels management practices to reduce the occurrence of devastating wildfire events.

Objective 2.4: Achieve and maintain an effective and efficient wildfire suppression capacity.

Strategy 2.4.1: Develop a statewide aviation plan.

Strategy 2.4.2: Ensure that OFS fire suppression equipment is capable of operating in a diverse fire environment and is managed under a consistent replacement schedule.

Strategy 2.4.3: Ensure that OFS fire suppression personnel are qualified and capable of performing required duties in a safe and effective manner.

Strategy 2.4.4: Improve wildfire response and coordination outside of OFS's initial attack protection area in eastern Oklahoma.

Strategy 2.4.5: Provide assistance to communities and fire departments throughout the state by providing the appropriate training and equipment to safely and effectively address the wildland firefighting needs in their jurisdictions.

Strategy 2.4.6: Maintain the capacity to respond to wildfire emergencies outside the state in support of the Southern Fire Protection Compact and USFS Master Cooperative Agreement.

Resources Necessary for State Forester to Address Strategies

Oklahoma Forestry Services' Deliverables and Program Areas																																									
	Management						Protection					Education			Support				Partnerships																			Farm Bill National		
Goals, Objectives, Strategies	Forest Regeneration	State and Private Forestry Assistance	Utilization and Marketing	Forestland Conservation	Urban and Community Forestry	Management Financial Assistance	Water Quality Protection and Management	Rural Fire Protection	Rural Fire Defense	Forest Health	Protection Financial Assistance	Environmental Education	Forest Heritage Center	Education Financial Assistance	Forest Resource Planning	Information Services and Communication	Safety and Training	Forest Inventory and Analysis	USDA Forest Service	Natural Resources Conservation Service	Farm Service Agency	Land Trust Organizations	Oklahoma State Parks	Oklahoma Department of Wildlife Conservation	US Fish and Wildlife Service	Oklahoma State University	Forest Industry	Bureau of Indian Affairs	Oklahoma Forestry Association	Oklahoma Urban and Community Forestry Council	Law Enforcement	Society of American Foresters	American Tree Farm System	National Wild Turkey Federation	Conserve Working Forest Landscapes	Protect Forests from Harm	Enhance Public Benefits from Trees and Forests
Issue: Wildfire Risks to the Forest Resource																																								
Goal: Reduce the risk of destructive wildfires to Oklahoma's natural resources and their threat to public safety.																																								
Objective 2.1: Raise public awareness of wildfire issues in Oklahoma.																																								
Strategy 2.1.1		X			X			X				X				X	X		X							X		X	X							X		
Strategy 2.1.2		X			X			X	X			X				X			X							X		X	X	X						X		
Strategy 2.1.3								X								X			X							X		X	X	X						X		
Strategy 2.1.4								X								X			X							X		X	X	X						X		
Objective 2.2: Develop a cohesive structure among state, federal, local and tribal fire control organizations within the state to reduce the occurrence and harmful effects of wildfire.																																								
Strategy 2.2.1								X	X							X			X									X		X						X		
Strategy 2.2.2								X								X	X		X							X	X	X	X	X	X					X		
Objective 2.3: Reduce the likelihood of devastating wildfires through the use of fire prevention, preparation and hazard mitigation practices.																																								
Strategy 2.3.1		X			X			X	X		X					X	X		X							X			X		X					X		
Strategy 2.3.2		X			X	X		X	X		X					X	X		X										X							X		
Strategy 2.3.3								X	X						X	X		X	X																		X		
Strategy 2.3.4		X	X		X	X		X	X	X	X					X			X	X			X	X														X		
Objective 2.4: Achieve and maintain an effective and efficient wildfire suppression capacity.																																								
Strategy 2.4.1								X											X									X			X						X		
Strategy 2.4.2								X	X		X				X				X																		X		
Strategy 2.4.3								X									X		X																		X		
Strategy 2.4.4								X	X						X				X							X		X			X						X		
Strategy 2.4.5								X	X		X					X	X		X											X						X		
Strategy 2.4.6								X	X							X	X		X																		X		

Issue: Forest Economics and Markets

Traditional forest products markets are changing or lack stability, causing great uncertainty among landowners and the communities that rely on the industry for jobs and economic growth. Although interest in ecosystem services and non-traditional wood products (carbon, biomass and bio-energy, recreation, water and wildlife) markets are increasing, market mechanisms for these are not well developed. Conflicts are likely to develop between new and traditional wood product markets. For any market, resource sustainability is critical. Access to forest inventory data at the local, state and regional levels is essential. The economic contribution of forestry to the state can increase substantially with better resource management and incentives, and focused attention on the new emerging markets.

In 2009, the Forest2Market Inc. produced a report that described the economic impact of privately owned forests across the United States. Privately owned forests are an important part of the Oklahoma economy. These forests employ active management techniques (land management planning, fertilizing, planting, thinning, and harvesting) to produce timber, logs, pulpwood, chips and wood fuel. These outputs are then used by manufacturers to create higher value wood products such as paper, furniture, energy, etc. According to the report, each job in a forestry related industry creates 1.8 jobs in other industries and on average each 1,000 acres of privately-owned forest is responsible for the creation of 8 jobs.

The recent downturn in the national economy, and especially the housing market, has seriously affected the state's forest products sector. The Weyerhaeuser Company's large pine sawmill at Wright City, in continuous operation since 1910, announced its closure in March 2009, putting 200 mill employees out of work. Other large mills, such as Huber's OSB plant and the Pan-Pacific's MDF plant at Broken Bow, Weyerhaeuser's sawmill at Idabel and the Valley Timbers' sawmill at Antlers, have temporarily reduced operations by more than 50%. The number of small sawmills is at its lowest level in recent history.

On the positive side, interest continues to increase in finding economic uses for the wide spreading juniper species and using woody biomass for renewable energy and biofuels is attracting considerable attention. A more detailed description of the Forest Economics and Markets Issue can be found in the Oklahoma Forest Resource Assessment.

Goal 3: Make information related to timber sales and forest product markets readily available.

Objective 3.1: Stay abreast of and communicate forest resource market information.

Strategy 3.1.1: Increase awareness of forest products and markets specific locations.

Strategy 3.1.2: Provide easy access to information and resource statistics of value to the industry, landowners or consumers.

Strategy 3.1.3: Increase awareness of national and international trade policy relative to the impacts on Oklahoma's forest resources.

Resources Necessary for State Forester to Address Strategies

Oklahoma Forestry Services' Deliverables and Program Areas																																								
	Management						Protection					Education			Support				Partnerships																		Priorities							
Goals, Objectives, Strategies	Forest Regeneration	State and Private Forestry Assistance	Utilization and Marketing	Forestland Conservation	Urban and Community Forestry	Management Financial Assistance	Water Quality Protection and Management	Rural Fire Protection	Rural Fire Defense	Forest Health	Protection Financial Assistance	Environmental Education	Forest Heritage Center	Education Financial Assistance	Forest Resource Planning	Information Services and Communication	Safety and Training	Forest Inventory and Analysis	USDA Forest Service	Natural Resources Conservation Service	Farm Service Agency	Land Trust Organizations	Oklahoma State Parks	Oklahoma Department of Wildlife Conservation	US Fish and Wildlife Service	Oklahoma State University	Forest Industry	Bureau of Indian Affairs	Oklahoma Forestry Association	Oklahoma Urban and Community Forestry Council	Law Enforcement	Society of American Foresters	American Tree Farm System	National Wild Turkey Federation	Conserve Working Forest Landscapes	Protect Forests from Harm	Enhance Public Benefits from Trees and Forests
Issue: Wildfire Risks to the Forest Resource																																								
Goal: Make information related to timber sales and forest product markets readily available.																																								
Obective 3.1: Stay abreast of and communicate forest resource market information.																																								
Strategy 3.1.1		X	X												X		X	X	X	X						X	X		X			X	X		X			X		X
Strategy 3.1.2			X												X	X		X	X								X		X						X			X		X
Strategy 3.1.3			X														X		X							X	X		X			X			X			X		X

Issue: Water Quality and Availability

The State of Oklahoma is blessed with 200 lakes and reservoirs, 167,600 miles of rivers and streams and roughly 55,646 miles of shoreline along lakes and ponds (Oklahoma Water Resources Board). The watersheds associated with many of these lakes and rivers are forested and provide clean water, excellent recreational opportunities, and habitat for many species of wildlife. Oklahoma forests produce the cleanest water of any land use, providing numerous public benefits, including absorbing rainfall, slowing and filtering runoff, reducing flooding, and recharging aquifers, yet the role of trees and forests in protecting water quality is not well recognized by the public. Therefore, maintaining and protecting forested watersheds, while important, is not considered by many landowners and citizens as high priority.

Human activities can impact water quality and quantity through a variety of methods, resulting in pollution categorized as either point source or non-point source in nature. Some examples of human activities that can lead to point and non-point source pollution affecting our water resources are poultry litter runoff, improper septic systems, improper pesticide application, timber harvesting, road construction, urban development, mineral extraction, excessive fertilization and oil and gas production sites.

Another factor that is contributing to non-point source pollution is urban stormwater runoff. According to the Environmental Protection Agency, the 2004 *National Water Quality Inventory* reports that runoff from urban areas is the leading source of impairments to surveyed estuaries and the third largest source of water quality impairments to surveyed lakes.

Well-managed forests and healthy forest watersheds produce the highest water quality, and they can be manipulated to benefit stream flows and accommodate downstream users to some extent. Trees and forests reduce soil erosion, protect stream banks, filter pollutants, and reduce impacts of storm water runoff. Proper forest management, including the use of Forestry Best Management Practices (BMPs), protecting streamside management zones and restoring riparian forests and planting trees to prevent erosion are critical elements of state efforts to protect water quality and availability. A more detailed description of the Water Quality and Availability Issue can be found in the Oklahoma Forest Resource Assessment.

Goal 4: Minimize adverse effects of human activities and other factors on Oklahoma's water resources.

Objective 4.1: Raise the awareness of decision makers, stakeholders and concerned citizens about the role of forests and trees in protecting water quality and sustaining water supplies in Oklahoma.

Strategy 4.1.1: Include BMP and water quality information in all OFS Forest Stewardship Plans.

Strategy 4.1.2: Make critical water quality points readily available on OFS homepage to encourage consideration and inclusion in timber sales.

Strategy 4.1.3: Contact applicable state and federal agencies to encourage forest water quality consideration in cost-share ranking and grant opportunities.

Objective 4.2: Assure that forest management and water quality management practices used in Oklahoma address the needs of the state's water resources and are based upon best available scientific information.

Strategy 4.2.1: Update and distribute Oklahoma's Best Management Practices for Water Quality on an 8 year interval.

Strategy 4.2.2: Conduct 2 BMP training sessions per year for loggers and landowners.

Strategy 4.2.3: Improve forest BMP implementation rate by 2%.

Objective 4.3: Actively engage in state and national water issues that impact forestry.

Strategy 4.3.1: Monitor changes in water legislation and policy at the state and national levels.

Strategy 4.3.2: Participate in planning and coordination issues of the Southern Group of State Foresters.

Resources Necessary for State Forester to Address Strategies

	Oklahoma Forestry Services' Deliverables and Program Areas																																				
	Management						Protection					Education			Support				Partnerships																Farm Bill National		
Goals, Objectives, Strategies	Forest Regeneration	State and Private Forestry Assistance	Utilization and Marketing	Forestland Conservation	Urban and Community Forestry	Management Financial Assistance	Water Quality Protection and Management	Rural Fire Protection	Rural Fire Defense	Forest Health	Protection Financial Assistance	Environmental Education	Forest Heritage Center	Education Financial Assistance	Forest Resource Planning	Information Services and Communication	Safety and Training	Forest Inventory and Analysis	USDA Forest Service	Natural Resources Conservation Service	Farm Service Agency	Land Trust Organizations	Oklahoma State Parks	Oklahoma Department of Wildlife Conservation	US Fish and Wildlife Service	Oklahoma State University	Forest Industry	Bureau of Indian Affairs	Oklahoma Forestry Association	Okalahoma Urban and Community Forestry Council	Law Enforcement	Society of American Foresters	American Tree Farm System	National Wild Turkey Federation	Conserve Working Forest Landscapes	Protect Forests from Harm	Enhance Public Benefis from Trees and Forestts
Issue: Water Quality and Availability																																					
Goal: Minimize adverse effects of human activities and other factors on Oklahoma's water resources.																																					
Objective 1.1: Raise the awareness of decision makers, stakeholders and concerned citizens about the role of forests and trees in protecting water quality and sustaining water supplies in Oklahoma.																																					
Strategy 4.1.1		X		X			X			X					X				X																		X
Strategy 4.1.2		X					X					X				X																					X
Strategy 4.1.3		X				X	X								X				X	X																	X
Objective 4.2: Assure that forest management and water quality management practices used in Oklahoma address the needs of the state's water resources and are based upon best availale scientific information.																																					
Strategy 4.2.1							X					X				X			X							X						X			X		X
Strategy 4.2.2							X																				X								X		X
Strategy 4.2.3		X					X												X								X								X		X
Objective 4.3: Actively engage in state and national water issues that impact forestry.																																					
Strategy 4.3.1							X									X			X													X					X
Strategy 4.3.2		X					X					X							X																		X

Issue: Community Forest Health and Care

Oklahoma's community forests are threatened by numerous factors, largely a result of the population density of the people living within this forest type. The community forest is often managed as individual trees or as small groups rather than looking at the entire landscape as a working forest ecosystem. Trees throughout our cities and towns, including individual trees in yards and parks, or along our streets and waterways, need to be viewed and managed as a working forest ecosystem to provide the greatest benefit of ecosystem services and highest quality of life for the residents within our communities. It is critical to take a proactive management approach to addressing the needs of our community forests because the make-up, health and overall condition of this forest impact the connected forests beyond the traditional city boundaries.

According to the American Forests, impervious surfaces have increased by 20% over the past 2 decades in urban areas across the United States. Stormwater facilities are created to compensate for the tree loss but these facilities are expensive to build and maintain. Planting trees and conserving greenbelts and corridors is a much easier way to reduce stormwater runoff and save money.

Community forestry information and education is not generating widespread support and advocacy at the local/municipal level needed to develop local proactive community forest management programs. Currently, only 21 out of 597 communities in Oklahoma are recognized as a Tree City USA. Although these communities represent approximately 70 percent of the urban population and 45 percent of the State's population, improvement in the number of participating communities will extend the benefits of community forestry statewide. A more detailed description of the Community Forest Health and Care Issue can be found in the Oklahoma Forest Resource Assessment.

Goal 5: Increase management and support conservation efforts in Oklahoma's community forests.

Objective 5.1: Increase the management of Oklahoma's community forests.

Strategy 5.1.1: Develop and maintain outreach initiatives to reach new communities and non-traditional audiences.

Strategy 5.1.2: Maintain a wide range of partnerships and coordinate with other organizations on community forestry issues.

Strategy 5.1.3: Assure that OFS professionals are appropriately trained in urban and community forestry principles and with issues they may encounter in the wildland-urban interface.

Strategy 5.1.4: Encourage community forest management activities that promote biodiversity and minimizes the threat of invasive species.

Strategy 5.1.5: Utilize our capacity to respond to natural disasters affecting community forests, including ice storms and severe weather events.

Strategy 5.1.6: Encourage and provide assistance with the development of community based wood utilization programs.

Strategy 5.1.7: Promote the appropriate use of fire in in urban areas to achieve specific management objectives.

Objective 5.2: Ensure the conservation of community forests.

Strategy 5.2.1: Encourage communities to actively manage greenbelts, riparian corridors and conservation easements.

Strategy 5.2.2: Assist with the development of local land-use policies, development incentives and ordinances.

Strategy 5.2.3: Encourage the formation of community forestry advocacy groups (e.g., Tree Boards).

Strategy 5.2.4: Provide leadership in adoption of community planning techniques, such as green infrastructure, management of urban watersheds using forestry techniques and conservation of open space.

Strategy 5.2.5: Promote the development or protection of open/green space in urban and interface areas.

Objective 5.3: Increase the understanding and appreciation of Oklahoma's community forests.

Strategy 5.3.1: Raise awareness among community leaders about forest-related issues and benefits, and encourage their consideration in planning and development.

Strategy 5.3.2: Document the benefits provided by trees and forests in an urban setting and promote the economic values of tree planting, tree care and the maintenance of forest cover in communities.

Resources Necessary for State Forester to Address Strategies

Oklahoma Forestry Services' Deliverables and Program Areas																																							
Goals, Objectives, Strategies	Forest Regeneration	State and Private Forestry Assistance	Utilization and Marketing	Forestland Conservation	Urban and Community Forestry	Management Financial Assistance	Water Quality Protection and Management	Rural Fire Protection	Rural Fire Defense	Forest Health	Protection Financial Assistance	Environmental Education	Forest Heritage Center	Education Financial Assistance	Forest Resource Planning	Information Services and Communication	Safety and Training	Forest Inventory and Analysis	USDA Forest Service	Natural Resources Conservation Service	Farm Service Agency	Land Trust Organizations	Oklahoma State Parks	Oklahoma Department of Wildlife Conservation	US Fish and Wildlife Service	Oklahoma State University	Forest Industry	Bureau of Indian Affairs	Oklahoma Forestry Association	Oklahoma Urban and Community Forestry Council	Law Enforcement	Society of American Foresters	American Tree Farm System	National Wild Turkey Federation	Conserve Working Forest Landscapes	Protect Forests from Harm	Enhance Public Benefis from Trees and Forestts
Issue: Community Forest Health Care																																							
Goal: Increase management and support conservation efforts in Oklahoma's community forests.																																							
Objective 5.1: Increase the management of Oklahoma's community forests.																																							
Strategy 5.1.1					X	X						X		X		X														X					X	X	X
Strategy 5.1.2		X	X	X	X														X											X					X	X	
Strategy 5.1.3		X	X	X	X												X		X																X	X	
Strategy 5.1.4																																							
Strategy 5.1.5		X			X	X				X						X			X																	X	
Objecitve 5.2: Ensure the conservation of community forests.																																							
Strategy 5.2.1		X		X	X		X					X				X	X		X	X										X					X		X
Strategy 5.2.2					X	X													X											X						X	
Strategy 5.2.3					X														X											X					X	X	
Strategy 5.2.4					X	X													X											X					X		
Strategy 5.2.5					X	X										X			X											X							X
Objective 5.3: Increase the understanding and appreciation of Oklahoma's community forests.																																							
Strategy 5.3.1					X							X		X	X	X			X											X							X
Strategy 5.3.2					X														X											X							X

Multi-State Areas (Regional Priority)

This section illustrates a few important forested areas found in Oklahoma that cross state boundaries. These are large project areas where funding can be focused on a landscape scale across multiple states. Oklahoma has identified many long-term strategies in the section above that will address the issues across these large forested landscapes. Oklahoma shares common issues with surrounding states and in these 3 large forested landscapes, long-term strategies, addressing these common issues, will be implemented. Coordination with other surrounding states of long-term strategies identified in these areas will be necessary for successful projects and implementation.

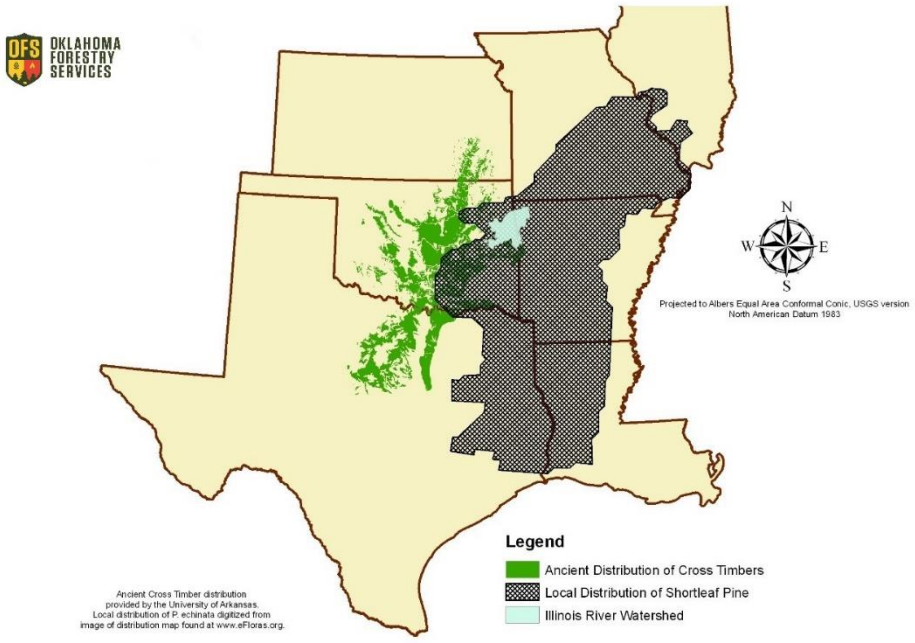


Figure 25: Multi-state priority areas.

National Priorities, Objectives, Outcomes and State and Private Forestry Core Performance Measures

S&PF Core Performance Measures: "The most significant indicators of success, used to assess accomplishments at the national level for all State and Private Forestry investments, organized by the Redesign National Priorities and Objectives."

Measures in italics are "pilot" measures. Redesign Implementation Council agreed upon a general format for the proposed measure, but recommends that these measures not be reported until spatial systems or other appropriate data are available to do so. In the meantime, special efforts should be made to develop qualitative case studies for these Outcomes.

National Priority	Objective	Outcome	Proposed Core Performance Measures	Qualitative Performance Reporting Options
Conserve Working Forest Landscapes	Identify and conserve high priority forest ecosystems and landscapes.	High priority forest ecosystems and landscapes are identified and conserved.	**CURRENT MEASURE –** High priority forest ecosystems and landscapes are protected from conversion (acres - annual and cumulative).	• Other Legacy Products - videos, state success stories, etc. • Other Program Options - Areas protected by states, assisted by FS studies; Cities protect forests after working with U&CF to develop plans.
	Actively and sustainably manage forests.	Forests are actively and sustainably managed.	**CURRENT MEASURE** • Number of acres in forest areas being managed sustainably as defined by current Forest Stewardship Management Plan (cumulative) – through a nationally consistent monitoring program.	• Numerous options, no specifics discussed.
Protect Forests from Harm	Restore fire adapted lands and/or reduce risk of wildfire impacts.	Fire-adapted lands are restored and/or risk of wildfire impacts is reduced.	**CURRENT MEASURE** • Number of acres treated to restore fire-adapted ecosystems that are (1) moved toward desired conditions and (2) maintained in desired conditions (annual) • Total # of acres treated to reduce hazardous fuels on state and private lands through State Fire Assistance (annual, direct federal grant only) • Percentage of at risk communities who report increased local suppression capacity as evidenced by: (1) The increasing number of trained and/or certified fire fighters and crews or (2) Upgraded or new fire suppression equipment obtained or (3) Formation of a new fire department or expansion of an existing department involved in wildland fire fighting.	• Numerous options, no specifics discussed.
	Identify, manage and reduce threats to forest and ecosystem health	Threats to forest and ecosystem health are identified, managed and reduced.	**CURRENT MEASURE** • Number and percent of forest acres restored and/or protected from (1) invasive and (2) native insects, diseases and plants (annual).	• Numerous options, no specifics discussed.

Measures in italics are "pilot" measures. Redesign Implementation Council agreed upon a general format for the proposed measure, but recommends that these measures not be reported until spatial systems or other appropriate data are available to do so. In the meantime, special efforts should be made to develop qualitative case studies for these Outcomes.

National Priority	Objective	Outcome	Proposed Core Performance Measures	Qualitative Performance Reporting Options
Enhance Public Benefits from Trees and Forests	Protect and enhance water quality and quantity.	Water quality and quantity is protected and enhanced.	**NEW MEASURE** • *Acres and percent of priority watershed areas where S&PF activities are enhancing or protecting water quality and quantity.*	• Special focus on developing qualitative case studies and success stories.
	Improve air quality and conserve energy.	Air quality is improved and energy is conserved.	**NEW MEASURES** • *Population of communities benefiting from S&PF activities designed to contribute to an improvement in air quality.* • *Population of communities benefiting from S&PF activities that result in energy conservation.*	• Develop case studies to tell the story of dollars saved per year using strategic planting for conservation.
	Assist communities in planning for and reducing forest health risks.	Communities plan for and reduce their risks from forest health threats.	**CURRENT MEASURE** • Number and percent of communities-at-risk covered by CWPP or equivalent that are reducing their risk of wildland fire (annual). • Percent of population living in communities developing or managing programs to plant, protect and maintain their urban and community trees and forests.	• Numerous options, no specifics discussed.
	Maintain and enhance the economic benefits and values of trees and forests.	The economic benefits and values of trees and forests are maintained and enhanced.	**CURRENT MEASURE** • Number of communities and percent of population served under an active urban forest management plan. **NEW MEASURES** • *Number of total jobs (direct, indirect and induced) sustained or maintained in the economy annually due to S&PF investments.* • *Total value of resources leveraged through partnerships with states and other partners.*	• Urban FIA in 5 states - utilize that to develop case studies of ecosystem services from urban forests. • Develop success stories highlighting job creation/retention. • Provide statistics on state/private forestland (especially NIPF) contribution to forest products sector. • Qualitative description of Legacy tracts' contribution to economic benefits, including recreation.

Measures in italics are "pilot" measures. Redesign Implementation Council agreed upon a general format for the proposed measure, but recommends that these measures not be reported until spatial systems or other appropriate data are available to do so. In the meantime, special efforts should be made to develop qualitative case studies for these Outcomes.

National Priority	Objective	Outcome	Proposed Core Performance Measures	Qualitative Performance Reporting Options
Enhance Public Benefits from Trees and Forests	Protect, conserve and enhance wildlife and fish habitat.	Wildlife and fish habitat is protected, conserved and enhanced.	**NEW MEASURES** • *Acres of priority habitat areas where S&PF activities are protecting, conserving and enhancing wildlife and fish habitat.* • *Acres of connected forest resulting from S&PF investments.*	• Special focus on developing qualitative case studies and success stories. • Qualitative information on T&E species protected on Legacy tracts. • Qualitative success stories about game species/other important species (not limited to T&E) on areas covered by Stewardship Plans.
	Connect people to trees and forests, and engage them in environmental stewardship activities.	People are connected to trees and forests and are engaged in environmental stewardship activities.	**CURRENT MEASURE** • Number of people who annually participate in FS and state forestry agency environmental literacy programs and activities. **NEW MEASURES** • *Number of people (measured in person days) engaged in environmental stewardship activities as part of a S&PF program.*	• Numerous options, no specifics discussed.
	Manage trees and forests to mitigate and adapt to global climate change.	Trees and forests are managed to help mitigate and adapt to global climate change.	**NEW MEASURES** • *Acres and percent of priority areas vulnerable to climate change where S&PF activities are contributing to resilient forests able to adapt to climate change.* • *Potential carbon sequestered through implementation of forest management practices that result from S&PF investments on private forestlands.*	• Special focus on developing qualitative case studies and success stories.

Appendices

Appendix A: Coordination with Stakeholders

4/9/2019 - Meeting with faculty from Oklahoma State University to discuss forest issues.

2/1/2020 – Meeting with USFWS, ODWC, and NWTF to discuss issues affecting wildlife enhancement and the Forest Action Plan.

5/3/2020 – Meeting with the NRCS regarding forest management and stewardship.

5/13/2020 - Discussion with ODWC about the State Wildlife Action Plan.

10/22/2020 – Meeting with USFS to discuss Good Neighbor Authority, Shared Stewardship, and input on Forest Action Plan.

10/30/2019 - Meeting with OWRB, OCC, NRCS, and Rural Water Association about source water concerns.

11/5/2020 – Meeting with State Technical Committee.

11/13/2020 - Meeting with ODWC, OCC, and NRCS to review forest identified forest issues.

Stakeholder List Includes:

Oklahoma Forest Advisory Committee (Stewardship Coordinating Committee): USDA Forest Service, USDA Natural Resources Conservation Service, USDOI Fish and Wildlife Service, Oklahoma Department of Wildlife Conservation, Oklahoma Department of Tourism and Recreation, Oklahoma Conservation Commission, Noble Foundation, The Nature Conservancy, Oklahoma State University, Oklahoma Forestry Association, Bureau of Indian Affairs, Oklahoma Forestry Services, Oklahoma Forest Industry.

State Technical Committee: Oklahoma Forestry Association, Noble Foundation, Oklahoma Conservation Commission, Oklahoma Forestry Services, Oklahoma Department of Environmental Quality, Oklahoma State University, US Fish & Wildlife Service, Natural Resource Conservation Service, US Forest Service.

*Not an exhaustive list of all members of the committees, only those that were met with.

Appendix B: Incorporated Natural Resource Plans or Projects

To help develop strategies to address the critical issues identified in the Oklahoma Forest Resource Assessment, information and data from existing programs as well as a number of natural resource plans were considered and utilized. Listed below are some of the other state and natural resource plans or projects incorporated into this Forest Resource Strategy.

- Oklahoma Comprehensive Wildlife Conservation Strategy, 2016 (State Wildlife Action Plan). Ron Suttles, Natural Resources Supervisor. Oklahoma Department of Wildlife Conservation. www.wildlifedepartment.com/

- Oklahoma Forest Legacy Plan, 2014 (Updated Assessment of Need). Kurt Atkinson, Assistant Director (retired). Oklahoma Forestry Services. www.forestry.ok.gov

- Ecoregional Assessments. The Nature Conservancy, Oklahoma Chapter. http://www.nature.org/wherewework/northamerica/states/oklahoma/about/science.html

- Oklahoma Comprehensive Water Plan, 2012 Update. Oklahoma Water Resources Board. http://www.owrb.ok.gov/supply/ocwp/pdf_ocwp/WaterPlanUpdate/

- Southern Forest Futures Project, 2013. U.S. Forest Service and Southern Group of State Foresters. https://www.srs.fs.usda.gov/pubs/44183

- Oklahoma Forest Resource Issues 1980 and Program Direction through 1995. John Burwell, State Forester (retired). Oklahoma Department of Agriculture, Forestry Division.

- Oklahoma Community Wildfire Protection Plans. Oklahoma Forestry Services. www.forestry.ok.gov

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SECTION 3
RELATIONSHIP TO NATIONAL TRENDS TABLE

Relationship to National Trends Table

S&PF National Objective	**Critical Issues in the State**	**Key Related Strategies/Effort in State Forest Action Plan**	**Planned Accomplishments** ***5*** year timeframe (using performance measures listed in prior section—measures in italics are not currently reported)	**Resources Needed** ***5*** year timeframe (fill in and add to as applicable)
1.1. Identify and conserve high priority ecosystems and landscapes	*Issue 1. Forest Sustainability and Health* *The productivity, health and environmental benefits of Oklahoma's forests and woodlands are threatened by land use changes, ecological pressures, economic issues and societal influences.* • *Lack of citizen awareness of state forest resources* • *Lack of adequate data regarding state forest resources (FIA only beginning to be available and used)*	***See Goal 1: Increase the active management of Oklahoma forestlands to enhance and maintain their productivity, health and environmental benefits of Forest Resource Strategy*** - *Objective 1.1 Ensure the sustainability, health and productivity of OK's forest and woodland by encouraging the proper use of forest management and improvement practices. Objective 1.2 Increase awareness of societal impact on OK's forest and woodland resources.*	M2 –landscape conservation plans *and coalitions of stakeholders engaged* M3 – Specific conservation projects or restoration actions identified (and *%* of priority areas) M4 –acres, % of high priority forest ecosystems and landscapes are protected from conversion by	State $1,193,118 USFS $1,193,118 Partnerships, Support and Data Sources necessary to accomplish the identified strategies and efforts are listed in the OFS Deliverables and Program Areas matrices
1.2 Actively and sustainably manage forests	*Issue 1. Forest Sustainability and Heath* *Issue 3. Forest Economics and Markets.* *Lack of markets for forest products contribute to lack of incentives for landowners to actively manage/invest in their forests and woodlands.* *Lack of landowner awareness of forest management practices.*	***See Goal 1: Increase the active management of Oklahoma forestlands to enhance and maintain their productivity, health and environmental benefits of Forest Resource Strategy*** - *Objective 1.1 Ensure the sustainability, health and productivity of OK forestlands by encouraging the proper*	M2 (a) – landowners and stakeholders receiving Forest Stewardship technical assistance M2 (b) – of landowners and stakeholders participating in Forest Stewardship educational programs M3 – acres *()* under Forest Stewardship Plans within priority areas M4 – *37* (and *10*f priority areas) managed sustainably as defined by current Forest Stewardship Management Plans	State $1,115,304 USFS $1,115,304 Partnerships, Support and Data Sources necessary to accomplish the identified strategies and efforts are listed in the OFS Deliverables and Program Areas matrices

S&PF National Objective	Critical Issues in the State	Key Related Strategies/Effort in State Forest Action Plan	Planned Accomplishments ***5*** year timeframe (using performance measures listed in prior section—measures in italics are not currently reported)	Resources Needed ***5*** year timeframe (fill in and add to as applicable)
	Critical forest ecosystems are at high risk of conversion/fragmentation or loss due to wildfire and/or poor health. Specific example are shortleaf pine and cross timbers ecosystems.	*use of forest management and improvement practices.* ***See Goal 3: Make information related to timber sales and forest product markets readily available of Forest Resource Strategy*** – *Objective 3.1 Stay abreast of and communicate forest resource market information. Objective 3.2 Maintain or increase the supply of wood products. Objective 3.3 Encourage the development of non-traditional forest products markets.*	(cumulative), through a nationally consistent monitoring program	
2.1 Restore fire-adapted lands and/or reduce risk of wildfire impacts.	*Issue 2. Wildfire Risk* *Note that most of Oklahoma's ecological communities are fire adapted.*	***See Goal 2: Reduce the risk of destructive wildfires to Oklahoma's natural resources and their threat to public safety of Forest Resource Strategy*** – . *Objective 2.1 Raise public awareness of wildfire issues in Oklahoma Objective 2.2 Develop a cohesive structure among state, federal, local and tribal fire control organizations with the state to reduce the*	M2 (a) – *# of* Fire Management Plans, Risk Assessments, or equivalent plans completed (includes Community Wildfire Protection Plans) (SFS *$* awarded for that purpose and *#* of communities assisted with that activity) M2 (b) – *# of* prevention or education programs conducted or implemented (SFA *$* awarded and *#* of communities assisted by such programs) M2 (c) – *# of individuals informed about goals of community wildfire protection plans.* M3 –*% of* at risk communities who report increased local suppression capacity as	State $7,170,744 USFS $7,170,744 Partnerships, Support and Data Sources necessary to accomplish the identified strategies and efforts are listed in the OFS Deliverables and Program Areas matrices

S&PF National Objective	Critical Issues in the State	Key Related Strategies/Effort in State Forest Action Plan	Planned Accomplishments ***5*** year timeframe (using performance measures listed in prior section—measures in italics are not currently reported)	Resources Needed ***5*** year timeframe (fill in and add to as applicable)
		occurrence and harmful effects of wildfires. *Objective 2.3 Reduce the likelihood of devastating wildfire through the use of fire prevention, preparation, and hazard mitigation practices.* *Objective 2.4 Achieve and maintain an effective and efficient wildfire suppression capacity.* *Extend efforts to inform the public, build resiliency in forested ecosystems, assist communities in planning for wildfire impacts and other opportunities.*	evidenced by: (1) The increasing *#* of trained and/or certified fire fighters and crews or (2) Upgraded or new fire suppression equipment obtained or (3) Formation of a new fire department or expansion of an existing department involved in wildland fire-fighting M4 (a) – *#*of acres treated to restore fire-adapted ecosystems that are moved toward and maintained in desired conditions (annual) M4 (b) – *#of* hazardous fuels reduction or mitigation projects conducted (SFA *$* expended and *#* of communities assisted by those projects) M4 (c) – *Total # of* acres treated to reduce hazardous fuels on state and private lands through State Fire Assistance (annual, direct federal grant only). *Acres* treated by mechanical means with by-products utilized	
2.2. Identify, manage and reduce threats to forest and ecosystem health.	*Issue 1. Forest Sustainability and Health* *Existing threats to the health and sustainability of the state's forest and woodlands come from conversion to non-forest uses, insect and disease, and climate variability.*	***See Goal 1: Increase the active management of Oklahoma forestlands to enhance and maintain their productivity, health and environmental benefits of Forest Resource Strategy*** *-* *Objective 1.3 Minimize the threats to OK's forest and woodland resources.* *Objective 1.4 Mitigate identified threats to OK's*	M2 – *Acres* of forested land surveyed for damage using national aerial survey standards M3 – *# and %* of forest acres restored and/or protected from (1) invasive and (2) native insects, diseases, and plants (annual)	State $1,193,118 USFS $1,193,118 Partnerships, Support and Data Sources necessary to accomplish the identified strategies and efforts are listed in the OFS Deliverables and Program Areas matrices

S&PF National Objective	**Critical Issues in the State**	**Key Related Strategies/Effort in State Forest Action Plan**	**Planned Accomplishments** ***5*** year timeframe (using performance measures listed in prior section—measures in italics are not currently reported)	**Resources Needed** ***5*** year timeframe (fill in and add to as applicable)
		forest and woodland resources.		
3.1 Protect and enhance water quality and quantity.	*Issue 4. Water Quality and Availability.* *Important watersheds across the state are impacted by man's activities. Some examples include poultry litter runoff, improper septic systems, improper pesticide application, road construction, urban development, and oil and gas production sites.*	***See Goal 4: Minimize adverse effects of human activities and other factors on Oklahoma's water resources of Forest Resource Strategy*** – *Objective 4.1 Raise awareness of decision makers, stakeholders and concerned citizens about the role of forests and trees in protecting water quality and sustaining water supplies in OK.* *Objective 4.2 Assure that forest management and water quality management practices used in OK address the needs of the state's water resources* *Objective 4.3 Increase incentives that will motivate landowners to consider water quality and related issues during their land use activities.* *Objective 4.4 Actively engage in state and national water issues that impact forestry.*	*M2 – Measure needed: Forest Stewardship and UCF planning that include water quality & quantity goals.* *M3 – Measure needed: Forest Stewardship and UCF training/workshops provided that include water quality and quantity components.* *M4 – Measure needed: Forest land with high priority goals for water quality conserved (FLP?)* M5 – *Acres and %* of priority watershed areas where S&PF activities are enhancing or protecting water quality and quantity	State $535,410 USFS $535,410 Partnerships, Support and Data Sources necessary to accomplish the identified strategies and efforts are listed in the OFS Deliverables and Program Areas matrices

S&PF National Objective	Critical Issues in the State	Key Related Strategies/Effort in State Forest Action Plan	Planned Accomplishments ***5*** year timeframe (using performance measures listed in prior section—measures in italics are not currently reported)	Resources Needed ***5*** year timeframe (fill in and add to as applicable)
		Educate all Oklahomans on forests' contribution to the water resource and the protection of the water resource.		
3.2 Improve air quality and conserve energy	*Not specifically addressed by state forest action plan.* *This is an emerging issue which will be included in the 10 year revision.* *.*	*OFS in cooperation with OK Department of Environmental Quality have completed its smoke management plan for the state. This has been accepted by EPA.* *Urban forestry program is partnering with utilities to develop energy awareness programming.*	M2 – *Measure needed: does information reported about UCF and Forest Stewardship planning identify inclusion of air and energy goals?* M3a – *Population of communities* benefiting from S&PF activities designed to contribute to an improvement in air quality M3b – *Population of communities* benefiting from S&PF activities that result in energy conservation	State $535,410 USFS $535,410 Partnerships, Support and Data Sources necessary to accomplish the identified strategies and efforts are listed in the OFS Deliverables and Program Areas matrices
3.3 Assist communities in planning for and reducing forest health risks	*Issue 2. Wildfire Risks.* *Issue 5. Community Forest Health and Care*	***See Goal 2: Reduce the risk of destructive wildfires to Oklahoma's natural resources and their threat to public safety of Forest Resource Strategy*** – *Objective 2.1 Raise public awareness of wildfire issues in Oklahoma* *Objective 2.2 Develop a cohesive structure among state, federal, local and tribal fire control organizations with the state to reduce the occurrence and harmful effects of wildfires.*	M2 – *# of* "managing" and "developing" communities M3 – *# and % of* communities-at-risk covered by a CWPP or equivalent that are reducing their risk of wildland fire (annual) M4a – *% of* population living in communities developing or managing programs to plant, protect & maintain their urban and community trees & forests M4b – *# of* volunteer hours contributed to urban and community forestry programs M5 – *# and %* of communities at risk covered by a CWPP or equivalent that are reducing their risk of wildland fire (annual)	State $1,649,652 USFS $1,649,652 Other $75,000 Partnerships, Support and Data Sources necessary to accomplish the identified strategies and efforts are listed in the OFS Deliverables and Program Areas matrices

S&PF National Objective	Critical Issues in the State	Key Related Strategies/Effort in State Forest Action Plan	Planned Accomplishments ***5*** year timeframe (using performance measures listed in prior section—measures in italics are not currently reported)	Resources Needed ***5*** year timeframe (fill in and add to as applicable)
		Objective 2.3 Reduce the likelihood of devastating wildfire through the use of fire prevention, preparation, and hazard mitigation practices. *Objective 2.4 Achieve and maintain an effective and efficient wildfire suppression capacity.* ***See Goal 5: Increase management and support conservation efforts in Oklahoma's community forests of Forest Resource Strategy*** *–* *Objective 5.1 Improve the management of OK's community forests.* *Objective 5.2 Ensure the conservation of community forests.* *Objective 5.3 Increase the understanding and appreciation of OK's community forests.* *Promote improved care of community forests through forest management plans and educating leaders and homeowners.*		

S&PF National Objective	**Critical Issues in the State**	**Key Related Strategies/Effort in State Forest Action Plan**	**Planned Accomplishments** ***5*** year timeframe (using performance measures listed in prior section—measures in italics are not currently reported)	**Resources Needed** ***5*** year timeframe (fill in and add to as applicable)
		Encourage CWPP development.		
3.4 Maintain and enhance the economic benefits and values of trees and forests.	*Issue 3. Forest Economics and Markets*	***See Goal 3: Make information related to timber sales and forest product markets readily available of Forest Resource Strategy*** – *Objective 3.1 Stay abreast of and communicate forest resource market information.* *Objective 3.2 Maintain or increase the supply of wood products.* *Objective 3.3 Encourage the development of non-traditional forest products markets.* *Encourage and support the development of new markets for ecosystem services and other forest-based benefits by providing information and technical assistance to interested parties*	M3 – *# of* communities and *% of* population served under an active urban forest management plan M2/3 – *Total value* of resources leveraged through partnerships with states and others partners M4 – *Need measure: perhaps # of participants receiving training annually through S&PF Programs and competitive projects.* M5 – *# of* total jobs (direct, indirect, and induced) sustained or maintained in the economy annually due to S&PF investments	State $535,410 USFS $535,410 Partnerships, Support and Data Sources necessary to accomplish the identified strategies and efforts are listed in the OFS Deliverables and Program Areas matrices

3.5 Protect, conserve, and enhance wildlife and fish habitat.	*Issue 1. Forest Sustainability and Heath* *Issue 2. Wildfire Risks.* *Wildlife and fish habitat are associated benefits of forest ecosystems. As forest health improves, so does wildlife and fish habitat.*	***See Goal 1: Increase the active management of Oklahoma forestlands to enhance and maintain their productivity, health and environmental benefits of Forest Resource Strategy*** - *Objective 1.1 Ensure the sustainability, health and productivity of OK's forest and woodland by encouraging the proper use of forest management and improvement practices* ***See Goal 2: Reduce the risk of destructive wildfires to Oklahoma's natural resources and their threat to public safety of Forest Resource Strategy*** – *Objective 2.1 Raise public awareness of wildfire issues in Oklahoma* *Objective 2.3 Reduce the likelihood of devastating wildfire through the use of fire prevention, preparation, and hazard mitigation practices.* *Improve forest resilience and health through increased forest management and use of prescribed fire.*	M2 –*Need a measure: perhaps part of forest stewardship training outreach to landowners?* M3 – *Acres and %* of priority habitat areas where S&PF activities are protecting, conserving, and enhancing wildlife and fish habitat M4 – *Acres of* connected forest resulting from S&PF investments	State $1,193,118 USFS $1,193,118 Partnerships, Support and Data Sources necessary to accomplish the identified strategies and efforts are listed in the OFS Deliverables and Program Areas matrices
3.6 Connect people to trees and forests, and engage	*Issue 1. Forest Sustainability and Heath*	***See Goal 1: Increase the active management of Oklahoma forestlands to enhance and maintain their***	M2 – *# of* people who annually participate in FS and state forestry agency environmental literacy programs and activities	State $1,115,304 USFS $1,115,304

S&PF National Objective	**Critical Issues in the State**	**Key Related Strategies/Effort in State Forest Action Plan**	**Planned Accomplishments** ***5*** year timeframe (using performance measures listed in prior section—measures in italics are not currently reported)	**Resources Needed** ***5*** year timeframe (fill in and add to as applicable)
them in environmental stewardship activities	*Issue 5. Community Forest Health and Care*	***productivity, health and environmental benefits of Forest Resource Strategy*** - *Objective 1.2 Increase awareness of societal impact on OK's forest and woodland resources.* ***See Goal 5: Increase management and support conservation efforts in Oklahoma's community forests of Forest Resource Strategy*** – *Objective 5.3 Increase the understanding and appreciation of OK's community forests.*	M3 (a) – *# of* people (in person days) engaged in environmental stewardship activities as part of an S&PF program M3 (b) – *# of* volunteer hours contributed to urban and community forestry programs	Partnerships, Support and Data Sources necessary to accomplish the identified strategies and efforts are listed in the OFS Deliverables and Program Areas matrices
3.7 Manage trees and forest to mitigate and adapt to global climate change	*Issue 6. Impacts of Climate Change* *Oklahoma sits at the fringe of several different forest types including the eastern hardwoods, the southern pines, the coastal plains bottomlands and the western pinyon-juniper forest type. Climate change may impact any of these forest types' continued existence within the state.*	***See Goal 6: Enhance the capacity of Oklahoma's forests to adapt to the environmental stresses of climate change of Forest Resource Strategy*** – *Objective 6.1 Maintain healthy vigorous forest ecosystems. Encourage use of adapted tree species; expand genetic diversity, increase species mixtures and management of forest structure.*	M2 – *Need a measure: perhaps Forest Stewardship Program education and assistance focused on vulnerability assessments and management practices for resilience and adaptation* M3 (a) – *Acres and % of priority areas vulnerable to climate change where S&PF activities are contributing to resilient forests able to adapt to climate change* M3 (b) – *Potential carbon sequestered through implementation of forest management practices that result from S&PF investments on private forest lands*	State $535,410 USFS $535,410 Partnerships, Support and Data Sources necessary to accomplish the identified strategies and efforts are listed in the OFS Deliverables and Program Areas matrices

This publication was developed and printed by the
Oklahoma Department of Agriculture, Food & Forestry, as authorized by Jim Reese, Secretary of Agriculture.
100 copies were printed at a cost of $?????. November 2015.
Copies have been provided to the Publications Clearinghouse of the Oklahoma Dept. of Libraries

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